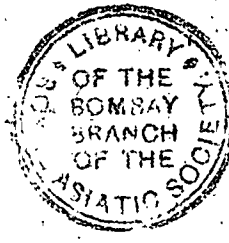
Annual Report of the Department of Agriculture in the Bombay Presidency, 1935-36



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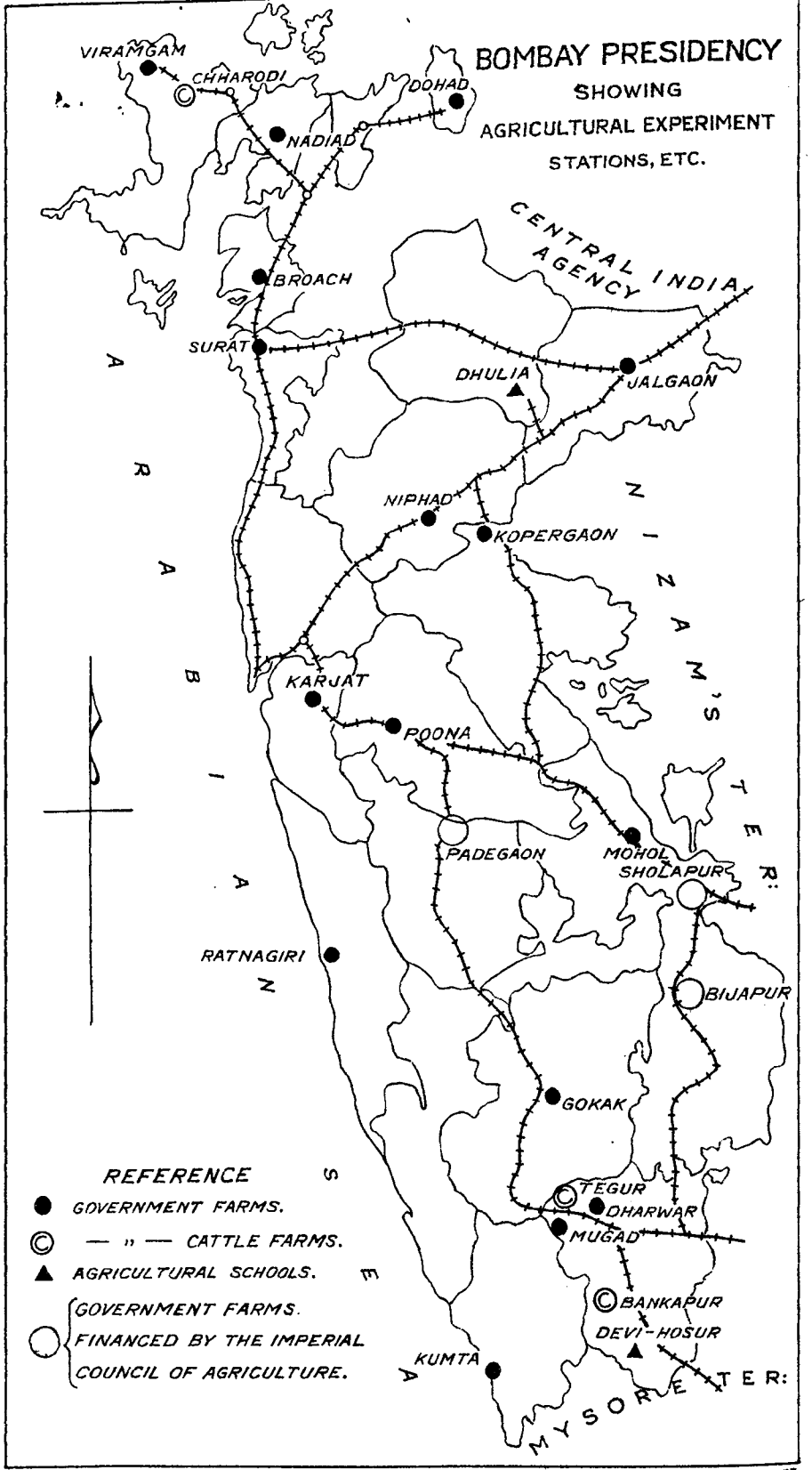
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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, BOMBAY PRESIDENCY, 1935-36.

CHAPTER I.

FEATURES OF THE YEAR.

CLIMATE AND OUTTURN.

The year 1935-36 was from the agricultural standpoint fairly satisfactory over a large part of the Bombay Presidency. The outstanding features of the season were long breaks in rains during the growing period mostly in July and August and again in the latter half of September over the greater part of the Presidency and the early cessation of monsoon. The long breaks though they caused lot of anxiety and reduced yields of kharif crops to some extent, being followed by the timely rains later on, were very helpful in maintaining clean cultivation at a very low cost. Judging from the outturn of crops the season was fairly good over most of the Konkan, the West Deccan and the irrigated areas; fairly satisfactory in Gujarat (except Ahmedabad), the East Deccan and the Karnatak but somewhat poor in Ahmedabad District. The season was particularly unfavourable for rice in all parts of the Presidency. The rabi season was poor in Gujarat, but was fairly good in the Deccan and the Karnatak though there were adverse factors such as an excess of rains in October in the Deccan and easterly dry winds in the Karnatak.

The following tabular statement compares the actual acreage sown and the estimated tonnage of the food-grain crops produced in the different Divisions of the Bombay Presidency during the years 1934-35 and 1935-36 :—

Division	Area in thousands of acres		Estimated outturn in thousands of tons	
	1934–35	1935–36	1934–35	1935–36
	Acres	Acres	Tons	Tons
Gujarat	2,398	2,466	746	758
Deccan	11,356	11,121	2,056	2,070
Karnatak	4,794	4,657	921	831
Konkan	1,601	1,603	694	656
Total, Bombay Presidency ..	20,149	19,847	4,417	4,315

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The table indicates that the yield of food crops has been satisfactory in Gujarat and the Deccan, especially in the latter Division where, notwithstanding a decline in area, the resulting outturn showed an appreciable improvement over that obtained last year. The reduction in yield in the Karnatak was due partly to the decrease in area and partly to the unsatisfactory character of the season in the Division while the drop in yield in the Konkan was due to the fact that the season under review was unfavourable to the rice crop.

The following statement shows that, taking all crops together, there has been little alteration in the total area sown during the preceding four years. The area under the food-grain crops was almost stationary, while that under cotton and groundnut exhibited definite improvement over the previous year.

Year.	Area in thousands of acres sown with different crops in the Bombay Presidency proper.			
	Food-grain crops (cereals and pulses).	Cotton.	Groundnut.	All crops.
	Acres	Acres	Acres	Acres
1931-32	20,059	4,065	989	29,372
1932-33	19,702	3,879	1,195	29,155
1933-34	19,792	3,655	1,292	29,181
1934-35	20,149	3,657	682	29,039
1935-36	19,847	4,163	891	29,373

The prices of rice, wheat and groundnut showed an improvement over last year and this was noticeable in the case of groundnut. The prices of cotton and jowar were considerably lower than those prevailing last year and in the case of cotton they went down to the level of 1933-34.

Prices prevailing at harvest time for agricultural produce in seers of 80 tolas per rupee except for cotton which are recorded in rupees per khandi of 784 lbs.

Year	Food crops			Export crops		
	Jowar (Sholapur)	Bajri (Nasik)	Rice (Thana)	Wheat (Ahmedabad)	Broach Cotton (Bombay)	Groundnut (Karad)
	Seers	Seers	Seers	Seers	Rs.	Seers
1931-32 ..	23	16	9	12	194	15
1932-33 ..	21	12	9	9	199	10
1933-34 ..	20	12	9	11	207	17
1934-35 ..	15	11	9	11	261	18
1935-36 ..	21	13	8	8	207	13

The actual fluctuations in cotton prices will be seen from the following statement which gives the prices in rupees per khandi (784 lbs.) of Broach cotton at Bombay during the year under report. The prices from February to May when the cultivator disposes of his crop were the lowest during the year :—

Month—1935	Prices in Rupees	Month—1936	Prices in Rupees
August	232	January	217
September	216	February	210
October	212	March	200
November	235	April	207
December	227	May	203
		June	219
		July	234

Sugar Development.

During the year all the factories referred to on page 3 of the last year's report worked to their full capacity. But in addition the Belvandi Sugar Farm Ltd. erected a plant of 150 tons capacity and crushed nearly 350 acres of cane. Thus there are now 8 up-to-date sugar factories in the Deccan.

The area of cane grown by the factories and the approximate sugar produced are given in the following statement :—

	Name of Factory	Area under cane actually crushed	Amount of sugar produced
		Acres	Tons
1.	The Belapur Company Ltd.	2,752	11,000
2.	The Marsland Price Sugar Factory, Kalamb ..	1,600	4,500
3.	The Saswad Mali Sugar Factory at Akluj	1,190	3,020
4.	The Maharashtra Sugar Factory at Khandala, Ahmednagar District	1,200	5,427
5.	The Ravalgaon Sugar Factory Ltd.	1,050	3,700
6.	The Phaltan Sugar Works Ltd., Pimpalwadi ..	1,502	5,050
7.	The Kolhapur Sugar Mills Ltd.	929	4,886*
8.	The Belwandi Sugar Farm Ltd.	343	1,532

*The Company purchased 22,000 tons of cane from outside.

Sugar Prices.

The statement of prices of sugar given below shows that, compared with last year, the price of Java sugar in Bombay showed a slight increase up to March 1936 and then a slight decrease for the rest of the year under report whilst the prices of Indian sugar show a slight rise up to December 1935 and then a slight fall :—

Statement showing prices of sugar (Indian and Java) from August 1935 to July 1936.

Month	Price of sugar at Bombay per cwt.	
	Indian	Java
1935	Rs. a. p.	Rs. a. p.
August	12 6 5	13 9 0
September	12 11 3	13 13 3
October	13 2 3	14 4 6
November	12 10 3	13 13 0
December	12 4 2	13 10 9
1936		
January	12 0 8	13 9 11
February	11 11 4	13 8 1
March	11 10 3	13 8 0
April	11 9 0	13 8 0
May	11 4 5	13 8 0
June	11 3 11	13 8 0
July	11 4 3	13 6 5

Gul Prices.

The average gul rates for the months of March, April and May in Poona from 1931 are given below :—

Year	Price of gul per palla of 250 lbs.	Area of cane in the Deccan
	Rs.	Acres
1931	15·66	40,238
1932	15·33	42,389
1933	10·79	45,592
1934	14·06	43,418
1935	18·59	47,832
1936	12·00	54,760

It will be seen that during the period of six years the price of gul reached the highest level of Rs. 18-10-0 per palla in 1935. This sudden rise may be attributed to the following reasons :—

(*a*) Reduction in the outturn of gul by reason of the utilisation of cane by sugar factories for the manufacture of sugar.

(*b*) Deterioration in the quantity as well as in the quality of gul due to occurrence of frost for two years in succession in the area of supply.

(*c*) Recovery of purchasing power in consuming localities as the season was fairly satisfactory over the greater part of the Presidency and the prices were improving.

(*d*) There was an all round optimistic outlook created as a result of general improvement in prices.

However this rise became short-lived. The sudden and tremendous fall in the price of gul during the year under report reduced the price almost to the rock bottom price of the year 1933. This may be attributed to the following causes :—

(*a*) The area and outturn of gul was the highest in 1935-36.

(*b*) The quality of the Deccan gul has been found below the mark.

(*c*) Supply of gul from the Nizam's Territory has been pouring into Khandesh and Berars and consequently the Deccan cane cultivator has lost these markets.

(*d*) The fall in cotton prices seem to have affected the purchasing power of the consuming centres of gul.

Marketing.

Under the heading " Organization " in the last year's report reference was made with regard to the marketing survey. During the year under report the marketing staff surveyed marketing conditions of (1) groundnuts, (2) linseed, (3) wheat, (4) rice, (5) tobacco, (6) grapes, (7) bananas, (8) strawberries, (9) milk, (10) cattle and (11) eggs.

Marketing of Fruits and Vegetables.—As a result of the recommendation of the Mango Marketing Committee appointed in 1925 by the Government of Bombay the Horticultural section of the Agricultural Department took up the question of improving the packing material for sending mangoes to the Bombay market and now-a-days most of the mangoes are packed in wooden crates instead of

in bamboo baskets. Different types of wooden boxes were tried side by side with the bamboo basket and trial consignments were sent from Ratnagiri to Bombay and also to Poona in order to study the damage done to the fruit and particularly the prices of fruit realized in the market. It was observed that the bamboo baskets being light were handled very badly which caused the jamming of fruits inside to a very great extent and the packing, being not secure, was liable to pilfering and the fruits realized lower prices compared with the prices realized for box-packed mangoes. The average loss due to damage and pilfering came to about 4 per cent. in the case of fruits packed in boxes while it was 16 per cent. in the case of fruit packed in bamboo baskets.

The progress made as a result of the report of the Committee for the marketing of fruits and vegetables in Bombay 1935 may be briefly summarized as under:—

> The question of appointing an advisory committee in connection with the marketing of fruits and vegetables is under the consideration of the Government. The Committee will consist of all interests concerned. The Bombay Corporation has already taken action to prevent retail sale in the whole-sale market and has provided additional covered shed for wholesale business in the Crawford Market. The railways and the steamship companies have issued instructions for better handling of fruit packages. The Railways, as a trial measure, have already given quarter rates on a variety of perishable fruits and vegetables from several important fruit growing centres in the Presidency to Bombay. Further it has been agreed to improve the holds in the steamers so that fruit may not be damaged in transit.

Regulated cotton markets.—The regulated cotton market at Dhulia was started in 1930-31 and has to its credit successful working for six years. For the first three years the amount of seed cotton that came into the market was about 32,000 carts which increased to 41,000 carts in 1933-34 and during the year 1935-36 to 56,087 carts. The number of disputes settled was 640. During these years the market committee has accumulated a saving of Rs. 16,305 in cash and immovable property worth about Rs. 5,500. This shows the great possibility of providing organized markets with all facilities for the growers and traders and yet leaving sufficient funds for other activities beneficial to the producer and merchant who contribute towards the organization of the market without

any extra levy on the producer. This only shows what a successful regulated market can achieve for the community, besides ensuring a fair deal to the seller and the buyer.

The regulated cotton market at Amalner started in 1934-35 is also making satisfactory progress and getting popular.

Regulated cotton markets have been established at Bailhongal in the Belgaum District and at Baramati in the Poona District. There is a demand for opening regulated cotton markets at other centres in Khandesh, such as, Shirpur, Shahada, etc., and the question of opening such markets at Bijapur, Dondaicha in Khandesh, Malegaon in the Nasik District, Bavla in Ahmedabad District and Broach is under consideration.

Cotton Marketing.—It was reported in the last year's report that the replacement of short staple cotton by a long staple cotton would help us to solve the difficulties felt in marketing most of our Indian cottons. It is gratifying to note that the efforts of the Lancashire Cotton Committee achieved considerable success in creating greater demand for Indian cotton in Lancashire and as much as nearly 5 lakhs of bales of cotton have been taken during the year under report. Reference was also made to the improved cotton for Broach tract, namely, Broach Deshi 8 for the extension of which a scheme has already been sanctioned by the Indian Central Cotton Committee, and is now in operation in the Broach District in Gujarat. This cotton was tested by the Shirley Institute in Lancashire and has been considered to be a particularly good sample of Broach cotton. It is considered suitable for spinning 36's warp yarn from single roving or 40's warp if double roving is used. The yarn was also considered to be strong. A number of tests of cultivators' cotton were also taken by Indian mills and a Bombay mill has reported it to be very good for 20's and fairly good for 30's warp. One of the Ahmedabad mills also reported that it was better in strength for 20's warp and 30's weft. This mill did not spin the cotton for higher warp than 20's . 20's warp gave 78 lbs. strength. Another Bombay mill which tested the cultivator's cotton reported that it spun 30·30's warp which gave a test of 52 lbs. whilst one more Bombay mill which tested the cultivators' cotton found that 20's warp gave 86 lbs. strength.

Tests were taken by the Matunga laboratory of B.D. 8 cotton grown in Broach mixed with equal quantity of 1027 A.L.F. grown on Surat farm. The mixture was considered

suitable to spin 39's warp while pure Surat 1027 A.L.F. was considered suitable to spin 34's warp and pure B.D. 8 grown in Broach was suitable to spin 40's warp, showing thereby that B.D. 8 cotton grown in Broach though slightly inferior in mean fibre length was superior in spinning, to 1027 A.L.F. grown on Surat Farm whether spun alone or mixed with Surat Cotton.

During the year under review 600 bales of pure B.D. 8 cotton were grown in the Broach District. Some of these were sold at a premium of Rs. 37 to 50 over Broach but owing to its slightly shorter staple some of the mills which have not used it, have been reluctant in offering more than Rs. 20 over Broach. Unfortunately this year premium offered for Surat cotton over Broach prices was also reduced to Rs. 30 to 40 per Khandi as against Rs. 50 to 90 in previous years. This was reported to be due to the purchases of Sindhi cotton by the Ahmedabad mills at a much cheaper rate. This may have also reflected on the prices offered for B.D. 8 cotton. The spinning tests made, however, by various Indian mills show clearly that B.D. 8 cotton is as good as 1027 A.L.F. or somewhat superior to it in spinning though it is apparently shorter in staple. Besides, B.D. 8 cotton mixes well with equal quantity of Surat and gives better spinning results and the mill-owners will be well advised to try B.D. 8 cotton for mixing with Surat cotton in equal proportion. The Department of Agriculture is making special efforts to persuade the mill-owners to try out B.D. 8 cotton and offer prices based on its spinning qualities rather than on apparent length of staple.

In Khandesh a medium staple cotton named N.V. 56-3, showing a fair resistant to wilt in fields, was tested out on 3 Government Farms and it has so far proved promising both in yield and fibre length and if the results are confirmed by district trials we may be able to replace short staple cotton of Khandesh, namely, Banilla and N. R. cotton by a medium staple cotton.

However, our experience in marketing improved cotton is very discouraging. When the mills are clamouring for $\frac{7}{8}$" to 1" staple cotton the production of which has not yet exceeded the demand, it is strange that the extra production of few thousands of bales of such cotton in Sind should affect so seriously the prices of similar cotton in Surat. It seems something is wrong in the marketing of cotton which works against the producer.

CHAPTER II.

AGRICULTURAL SERVICE AND PROPAGANDA.

Rural Uplift.

During the year under report the Government of India gave substantial monetary help to all provinces for rural uplift work and Bombay got its due share. These grants were distributed by the Bombay Government to different districts on population basis and were kept at the disposal of the Collectors. Schemes suitable to the conditions of the different districts were put up by the Agricultural Department and most of these were accepted and put into operation. The following statement shows the amounts allotted to the Agricultural Department during the year :—

	Rs.
North Central Division ..	50,855
Southern Division	39,460
South Central Division ..	19,415
Gujarat	6,380

These grants are spread over a period of three to five years. These are mainly for supply of improved seed, cane sets, bunding, improvement of cattle, improvement of poultry, improvement of sheep breeding, conservation of farm yard manure, establishment of nurseries, etc. The work done with the help of these grants has been described in the following paras.

For the working of the four schemes mentioned on page 9 of the last year's report, the Government of India have sanctioned Rs. 59,000 spread over 5 years and placed at the disposal of the Live Stock Expert. The objects of the schemes and results achieved are described below :—

Scheme No. I.—Improvement of the buffalo and help to the villager with the following objects—

1. To ascertain which of his stock is paying him.

2. To select from the best buffaloes male stock for further improvement.

3. To examine methods now employed for utilization of milk and to suggest ways and means to get better results.

The centres near Anand, Jalgaon, Belgaum and Pandharpur were selected for the purpose of testing buffaloes and subsequently for selection of buffalo bull calves. Several

places were also visited and advice on cattle breeding, buffalo keeping, dairying, manufacture of dairy products, feeding of cattle and testing of milk was given in addition to addressing various meetings. 506 buffaloes were tested which gave 34 selected buffalo bull calves as future breeding bulls and 96 dairy demonstrations were arranged.

Scheme II—Poultry improvement in villages.—This is aimed at removing all country cocks in certain selected villages and giving in their stead English birds bred and acclimatized on the Central Poultry Farm, Kirkee, and purchased from other reliable breeders. In all, 199 cocks were put out in seven districts as shown below and there are about 2,500 cross chicks hatched out during the season from October to March :—

	Number of cocks and breed.
Poona District	40 White Leghorn. 2 Rhode Island Red.
Belgaum District	24 White Leghorn.
Sholapur District	10 White Leghorn. 12 White Wyandotte. 6
Satara District	33 White Leghorn. 16 A. O. (Austrolorp).
Ahmednagar District ..	12 White Leghorn.
Kolaba District	22 Rhode Island Red.
Dharwar District	20 White Leghorn.

It is interesting to note that the adjoining villagers purchased eggs fertilized by the White Leghorn cocks placed out by the Department at 12 annas a dozen for hatching purposes, whereas the rate in breeding seasons generally varies from 4 to 5 annas. Thus the villagers who kept our cocks have greatly profitted and this has gone a long way to convince the villagers of the usefulness of the cross breeding.

Scheme III—Encouragement of pedigree poultry keeping.—Survey regarding the selection of prospective breeders is in progress and so far the following places have been selected for poultry keeping by grant of premia to poultry farmers for maintaining poultry farms :—

Belgaum, Korti (Pandharpur Taluka),
Vangaon (East Khandesh District), and
Upin Bettigiri (Dharwar District).

One premium of Rs. 75 to start a pedigree poultry farm was given at Korti in Pandharpur Taluka.

Scheme IV—Co-operative egg collection, grading and marketing.—There are two such co-operative egg collecting societies—one in Satara District at Elur and the other at Belgaum proper. Both are registered societies.

The Elur Society.—There are about 18 villages around Elur within a radius of 5 miles from where egg-producers send their eggs to be sold through the society. There are about 5,000 deshi fowls in these villages. From 1st November to June 30th, 1936, the society candled, graded and sent as many as 37,526 eggs to Bombay. The grading results were as follows :—

5	Tolas	71
$4\frac{1}{2}$	„	494
4	„	4,900
$3\frac{3}{4}$	„	6,008
$3\frac{1}{2}$	„	7,822
3	„	6,771
$2\frac{1}{2}$	„	3,210
and under $2\frac{1}{2}$	„	8,250
		37,526

The idea is to teach villagers how to sell their eggs on a co-operative basis.

The Belgaum Society.—The producers here keep all improved fowls and the eggs are generally of large size, viz. about 5 tolas. This being a Military station large sized eggs are in great demand and the society can hardly meet the requirements.

Publicity.

During the year the Department organized 102 shows, 2,000 demonstrations, 136 agricultural meetings, 29 magic lantern lectures, 13 jamabandi meetings and 10 cattle shows. The number of demonstrations is greater than that of last year and these demonstrations are arranged for educating the cultivators to adopt special items of agricultural improvements.

Distribution of Seeds of Improved Crops.

It was noted in the last year's report that the problem of supply of improved seed is a necessary sequence of the successful research work. This is the final stage in which the cultivator is interested. This work entails organization for production and distribution which is apparently costly but which puts more money in return into the pockets of the cultivator.

Rice seed distributed in 1935 season.—In North Thana seed of K. 226 strain was distributed in Palghar and Bassein talukas and Umbergaon Petha. 1,071 lbs. of farm seed was distributed to first class registered seed growers and 13,500 lbs. seed from first class registered seed growers was given out to second class registered seed growers. Besides, 38,200 lbs. of seed is estimated to have been distributed by the second class registered seed growers. The quantity of seed stocked for distribution by first class registered seed growers for the 1936 crop amounts to 7,300 lbs.

2. Strain No. K. 540 (mid-late) and K. 184 (early) are gaining in popularity. 2,627 lbs. of seed of the former and 1,980 lbs. of the latter variety were distributed to registered seed growers. For the 1936 crop, 1,200 lbs. of the former and 600 lbs. of the latter have been stocked. K. 42 (late) was also grown by first class registered seed growers and 10,000 lbs. of seed has been stocked for the 1936 season.

3. Twelve seed depôts in Dahanu and 4 in Palghar talukas have stocked seed of the foregoing three rice strains aggregating to 15,300 lbs. and 2,240 lbs., respectively, for distribution by exchange with cultivators' paddy.

4. In the Kolaba District 4,375 lbs. of farm seed of K. 42 was distributed to 33 first class registered seed growers in Karjat, 945 lbs. in Panvel and 1,400 lbs. in Pen talukas. Seed obtained from first class registered seed growers amounting to 28,565 lbs. was distributed in Panvel and Pen talukas. In these three talukas 35,700 lbs. of seed has been stocked for distribution in the 1936 season.

Seed produced on the Government Farms.—Seeds of improved strains of rice Nos. K. 42, K. 226, K. 412, K. 540 and K. 184 were multiplied on the Karjat Farm and on a plot of ten acres taken on lease for the purpose. The quantity of seed stocked for distribution in 1936 season is 15,147 lbs. of K. 42, 1,071 lbs. of K. 226, 602 lbs. of K. 412, 833 lbs. of K. 540 and 35 lbs. of K. 184. This seed will be available for the registered seed growers. 1,000 lbs. of pure seed of various Kolamba strains were supplied from the Karjat Farm to the Deputy Directors of Agriculture for multiplication and district trials in their divisions. 3,459 lbs. of the various improved wheat strains were also supplied to the various Deputy Directors of Agriculture. In the Ratnagiri District, 16,310 lbs. of seed of the rice strains Patni 6, Panwel 61, Bhadas 6 and Kolamba Nos. 401, 181 and 42 was supplied to 185 registered seed growers. This was sufficient for 260 acres. This area produced nearly 3 lakhs

of lbs. of seed which was supplied for 5,000 acres under general cultivation (2nd stage). The seed of various improved strains produced on the Ratnagiri and Karjat Farms supplied to the registered seed growers in the month of May 1936 came to 15,450 lbs. In the Southern Division 225,477 lbs. of Mugad strains 161, 81, 249 and 141 and Antersal 67, 90 and 200 were distributed and 109,345 lbs. of Maskati strain 1315, Jadda 1061 and Halga 244 were distributed.

Nagli Seed Distribution.—During the last year 2,819 lbs. of different strains of Nagli strains, i.e., A-18, B-11, E-31 and E-82 were supplied to 96 registered seed growers for 225 acres which produced nearly 1 lakh lbs. of seed. Half of this seed was again distributed to the second set of growers for 5,000 acres. In Devgad and Rajapur Talukas, 4,000 lbs. of pure nagli seed of the abovementioned strains was distributed for further multiplication under the control of the Taluka Development Associations.

During the last season Hatkhamba sub-station produced 2,800 lbs. of seed of the different nagli strains which is made available for distribution during the next season, i.e., 1936–37.

Wheat Seed Distribution.—8,984 lbs. of seed of strain No. 224 was produced on the Jalgaon Farm and this was distributed to owners of private seed farms. Besides, 70,129 lbs. of seed sufficient for 1,170 acres was distributed to registered seed growers in East Khandesh. Owners of private seed farms have stocked seed amounting to 79,090 lbs. for the 1936 crop. The distribution of seed No. 162 has been discontinued in favour of wheat No. 168.

13,800 lbs. of seed of wheat No. 168 was produced on the Jalgaon Farm and this was distributed to the owners of private seed farms in West Khandesh. Besides, seed amounting to 74,270 lbs. sufficient for 1,238 acres was distributed to registered seed growers. Owners of private seed farms have stocked 46,560 lbs. of seed for the 1936 crop.

1,074 lbs. and 49 lbs. of seed of wheat No. 808 was produced on Niphad and Jalgaon farms, respectively, and these were given out to private seed farms in Nasik District. Besides, 64,960 lbs. of seed sufficient for about 1,300 acres was distributed to the registered seed growers in Nasik District. Owners of private seed farms produced 10,576 lbs. of seed but it is not considered as well developed and therefore is not satisfactory for sowing. This wheat, however, has been observed to suffer more from cold wind and frost and on this account its spread may be checked.

2,100 lbs. and 700 lbs. of seed of Pusa No. 4 was produced on the Bhadgaon and Dhulia farms, respectively, and these were supplied to the private seed farms in Sakri Taluka of West Khandesh. Besides, seed amounting to 46,004 lbs. sufficient for about 683 acres was distributed to the registered seed growers in Nasik and East and West Khandesh districts. Owners of private seed farms in Malegaon and Sakri have stocked 25,440 lbs. of seed for the 1936 crop. The Bhal tract of Gujarat has grown about 5,000 acres against 4,200 of last year under No. 224. Pusa 4 wheat was distributed to the extent of 11,110 lbs. in Panch Mahals District against 20,506 lbs. in the previous year. In the South Central Division a small quantity of Pusa 111 was ordered from the Imperial Botanist, Pusa, for trial, but on account of hot-water treatment, its germinating power was lost and its real advantage could not be seen. The natural spread of Pusa 4 is, however, going on in the Deccan, and at present there are more than 10,000 acres under Pusa 4 in the South Central Division. The new strains of Niphad 808 and 809 were superior to local but they were not immune from rust.

In the Southern Division 680 lbs. of seed of strain 808 were distributed.

Improved Jowar Seed.—15,108 lbs. of seed of Budh Perio 53 was distributed from the Surat Farm in the Surat District as against 20,981 lbs. in the previous year. Also 20 fresh centres have been selected for multiplying the seed in the Surat District. The new strains of jowar evolved at Mohol Farm in in the Sholapur District, viz. 47-3, 35-1, M-9 and Dagdi No. 15 were tried in Sholapur and Ahmednagar districts and in most of these localities it has given an increased yield of 10 to 15 per cent. In the comig year arrangement has been made to multiply these strains with the help of the Taluka Development Associations.

Improved Sugarcane Varieties.—The distribution of these on the Deccan Canals was as under :—

5,22,250	E. K.	28
9,500	P. O. J.	2878
11,400	P. O. J.	2883
30,700	H. M.	89
8,000	C. O.	290
5,000	H. M.	320
1,35,500	C. O.	360
21,200	C. O.	419

The area under the new varieties is automatically spreading rapidly and at the end of this year, the approximate area under each of the varieties on the Deccan Canals is as follows :—

Name of the variety.	Area on the Deccan Canals.	
	Planted by cultivators.	Planted by sugar factories.
	Acres	Acres
E. K. 28	3,850	6,150
P. O. J. 2878	650	5,550
C. O. 290	120	2,400
C. O. 360	40	100
H. M. 320	....	300
Total ..	4,660	14,500

The total area under sugarcane on the Deccan Canals may be roughly 30,000 acres and thus nearly 63 per cent. of the area is now under the new varieties.

C. O. 213 is spreading rapidly in the Surat, Kaira and Panch Mahals districts. The area has gone up to 800 acres in Kaira District and 2,000 acres against 1,500 acres of last year in the Panch Mahals District. However, the future prospects do not seem to be favourable on account of prevailing low rates of gul.

In the Southern Division, 867,775 sets of J. 213 and 123,000 sets of H. M. 544 and 87 were distributed.

Groundnuts.—In the Southern Division, 4,471 lbs. of Spanish peanut strain No. 5 and 436 lbs. of Pondicherry strain No. 8 were distributed.

Seed Supply (Cotton).

During the year under report the Indian Central Cotton Committee sanctioned for Karnatak a comprehensive seed distribution and extension scheme for the spread of Jayawant Cotton to cover $7\frac{3}{4}$ lakhs of acres from 7 centres and of Gadag No. I cotton to cover an area of $1\frac{3}{4}$ lakhs acres from 2 centres in the next 5 years at a total cost of Rs. 2,66,772 on condition that the Government of Bombay contributed about Rs. 45,000 for the period.

The following tables show the work done under the Hubli and Athni Jayawant cotton seed distribution schemes and the Gadag cotton seed distribution scheme :—

Seed distributed in 1935–36.

Name of variety.	Stage.	Quantity of seed distributed in 1935–36.	Area in acres.	Quantity of produce obtained in dokras for seed (336 lbs.
		Lbs.	Acres.	Dokras.
Hubli Centre.				
Jayawant	III	8,540	591	250
	IV	1,81,959	13,697	1,963
	VA	1,10,890	11,089	....
	VB	11,36,633	1,18,423	218
Total ..	..	14,38,022	1,43,800	2,431
Dharwar-Navalgund.				
Jayawant	IV	....	....	577
	VA	....	....	1,066
	VB	....	....	72
Total ..	..	....	....	1,715
Haveri and Savanur.				
Jayawant	VA	....	....	577
	VB	....	....	615
Total ..	..	....	....	1,192
Athani Centre.				
Jayawant	III	1,948	211-20	48
	IV	6,012	678-29	126
	V	57,883	4,957-7	873
Total ..	..	65,843	5,847-16	1,047
Gadag Centre.				
Gadag No. 1	II	170	14-8	18
	III	2,298	216-24	144
	IV	35,617	3,308-31	1,908
	V	2,40,037	21,718-39	7,416
Total ..	..	2,78,122	25,258-22	9,486

Seed distribution in 1936–37.

Name of variety.	Stage.	Approximate quantity of seed purchased for distribution in 1936-37.	Quantity of seed to be purchased.	Total quantity of seed to be stocked for 1936-37.
		Lbs.	Lbs.	Lbs.
Hubli Centre.				
Jayawant	III	67,900	....	67,900
	IV	5,27,800	....	5,27,800
	VA	....	1,00,000	1,00,000
	VB	60,480	....	60,480
Total ..	..	6,56,180	1,00,000	7,56,180
Dharwar and Navalgund Centres.				
Jayawant	IV	26,900	4,200	31,100
	VA	2,63,340	....	2,63,340
	VB	20,250	28,000	48,250
Total ..	..	3,10,490	32,200	3,42,690
Haveri and Savanur Centres.				
Jayawant	VA	1,54,000	....	1,54,000
	VB	1,61,000	....	1,61,000
Total ..	..	3,15,000	....	3,15,000
Athani Centre.				
Jayawant	III	15,260	....	15,260
	IV	40,740	....	40,740
	V	2,84,900	....	2,84,900
	VI	86,141½	....	86,141½
Total ..	..	4,27,041½	.....	4,27,041½
Gadag Centre.				
Gadag No. 1	II	4,784	....	4,784
	III	4,027	26,000	30,027
	IV	2,43,500	....	2,43,500
	V	7,58,500	....	7,58,500
Total ..	..	10,10,811	26,000	10,36,811

This new scheme came in force from 1st June 1936, but all preliminary arrangements for stocking the seed had to be made during this year. The object of this new scheme is to work through all the agencies available and attempt to extend the cultivation of these two improved cottons more rapidly than before over almost the whole of the cotton growing tract of the Southern Division.

The Second scheme for the distribution of Banilla cotton seed in Khandesh costing Rs. 60,991 spread over a period of 2 years is under the consideration of the Government of Bombay as well as the Indian Central Cotton Committee.

This is the fifth year of the Khandesh Banilla cotton seed scheme and the following table shows the quantity of seed produced in different stages during 1935–36 :—

Stage.	Place.	Area in acres.	Seed purchased and stocked in.	Remarks.
			Lbs.	
I	Dhulia School and Bhadgaon Farm ..	10	800	Selfed seed.
II	Bhadgaon Farm ..	106	15,730	Produce of selfed seed.
III	Bharvas and Kol-pimpri groups ..	2,208	2,18,530	Produce from seed supplied from Bhadgaon Farm.
IV	Registered seed growers ..	17,580	5,89,705	Produce from seed supplied from stage III.
V	General Distribution .	....	....	The seed from Stage IV will be used.
	Total ..	19,904	8,24,765	

This seed would suffice for about 32,990 acres at the rate of 25 lbs. per acre. The total quantity of seed distributed for sowing in the 1935 season was 7,99,350 lbs. in the inner and outer reserved areas. This occupied 19,788 acres. Out of the total quantity of 16,41,614 lbs. of seed obtained from Stage IV and referred to on page 16 of the last year's Annual Report, 8,04,917 lbs. were distributed in Khandesh to suffice 32,200 acres and the balance was partly used for the seed growers of stage IV of the 1935 crop and partly for meeting indents from the South Central Division and the Kathiawar States. It is estimated that as a result of the operations the Banilla Cotton in Khandesh has spread to 1,30,000 acres. 2,500 lbs. of seed of Banilla Cotton was also grown on the Jalgaon Farm and further multiplied on private seed farms

at Salsingi in Bhusaval Taluka and Mhaswad in Jalgaon Taluka and 31,360 lbs. of seed was distributed by the Taluka Development Associations concerned.

The western part of Khandesh, particularly Navapur Taluka, grows Surat Cotton and 27,716 lbs. of 1027 A. L. F. cotton seed sufficient for 962 acres was distributed in that tract to purify the cotton and to get better prices.

Banilla Cotton Scheme in the Deccan.—This is the second year of the scheme financed from the funds of the Indian Central Cotton Committee. This scheme is a small one run on a Government Farm on canal irrigation leased at a small rental of Rs. 5 per acre. The rotation followed is cotton and groundnut. Cotton yield has come up to 733 lbs. per acre and that of groundnut to 1,630 lbs. per acre. Thus the yields are high and the scheme pays its own way. Although the total area of seed grown was 1,000 acres, half was required to be grubbed up due to the severe attack of caterpillars in the early stage and some of the area was dibbled with local seed for filling gaps. There was thus only 250 acres which produced 64,375 lbs. of pure seed. This was distributed for general cultivation.

Surat Cotton Seed Distribution.—During the year the Sonsak Group of Co-operative Cotton Sale Societies which had agreed to work as one of the seed groups in the Olpad Taluka under the control of the Agricultural Department again went out of the seed groups. In place of this, a group has been formed at Kim in the north of Olpad as a centre for the spread of 1027 in the Olpad Taluka. The Bardoli group was also disorganized due to internal disputes amongst the shareholders of the Bardoli Patidars' Gin and some of the members of the groups got their cotton ginned outside. Thus the total area under control was reduced to 12,826 acres. It is expected that the area under the Bardoli seed group will increase during the current season and that there will be no difficulty in maintaining the supply of pure seed for the Surat tract.

During the year the total quantity of seed handled by the Department amounted to 26,87,009 lbs. out of which 23,698 lbs. of seed was produced on the Surat Farm for growing in the reserve areas of a few selected villages in various seed groups. 16,94,879 lbs. of seed produced by the various seed groups were purchased for general distribution in the Surat tract and the adjoining States. The Hansot Co-operative Cotton Sale Society distributed 79,616 lbs. of its own seed to its members. Out of the total quantity of seed (26,87,009 lbs.), 12,09,063 lbs.

were supplied to British residents in the district by opening 26 depôts and 14,77,964 lbs. were supplied to the Indian States of Rajpipla, Bansda, Idar and Baroda.

As a result of the Cotton Control Act against goghari which has come into force from 1st June 1936 both in the British as well as the adjoining Baroda territory, the gin-owners were particularly careful in heaping and ginning separately all genuine 1027 cotton for getting pure seed which they sold to the Baroda State and to their own clients. Similarly, a gin-owner at Surat and Bardoli also purchased 1,01,150 lbs. departmental seed for supplying to their clients. This will materially help the Department in spreading 1027 A. L. F. cotton and eliminating goghari. The area under goghari which was 1,813 acres in 1934–35 has been reduced to only 660 acres this year. A vigorous campaign has been carried out to see that the Act is made known to each and every individual throughout the area with the help of Mamlatdars and it is hoped that goghari will be completely eliminated.

B.D. 8 Cotton Seed Extension Scheme for the Nerbudda-Mahi Tract.—This scheme was sanctioned by the Indian Central Cotton Committee in August 1935 for a period of three years at an estimated cost of Rs. 10,460 and it commenced work in December 1935. During the year an area of 3,024 acres was under pure B.D. 8 cotton. This area yielded 725 kalsis cotton seed (kalsi=640 lbs.) and 615 full-pressed bales of lint some of which fetched a premium of Rs. 37 to 50 over Broach. Out of 725 kalsis of seed produced, only 300 kalsis could be disposed of for seed purposes. However, the low premium over Broach offered for B.D. 8 cotton by the millowners owing to this cotton being new, its staple being apparently short and the millowners being not well acquainted with its spinning results, has made the extension of B.D. 8 cotton in Broach more difficult. B.D. 8 cotton gins very low though it yields better and has as good a spinning quality as Surat cotton. The gin-owners are reluctant to pay proper price for this cotton as they buy cotton in this tract on ginning percentage and not on quality. Unless the cultivators get full compensation for loss in ginning by way of better price it will be difficult to spread this better cotton into the Nerbudda-Mahi Zone. Gin-owners are being persuaded to gin and market B.D. 8 cotton pure so that it can get its proper value and the millowners are being persuaded to try a few bales of this cotton to ascertain its spinning quality.

Livestock Work.

The importance of livestock to Indian Agriculture was specially stressed in the last year's Annual Report. It was also pointed out how livestock keeping is closely related to general agriculture. Wherever livestock is maintained only on grazing land, very little progress has been made. Crop growing has been considered essential for proper feeding and rearing of livestock as well as for getting the best economic results. It was also pointed out that the work of improvement of cattle required intensification and unless the public took greater interest in the work, the work was too big for the Government agency alone to handle. Fortunately, His Excellency the Viceroy's appeal to the general public for intensifying the work of livestock improvement has come in time and it has been well received in this Presidency. Even Panjrapolés that at one time would not accept our policy of their breeding better cattle have now come round and are doing whatever lies in their power for breeding better cattle. Many Panjrapoles and Gowshalas have offered the Department a selection from their male stock to be placed out as breeding bulls. Unfortunately, many of these offers have had to be turned down as the bulls offered were of mixed breed and were of no use for the improvement of cattle. In this Presidency, unlike any other province in India, owing to the variation in conditions we have many breeds each of which is peculiarly suited to the conditions of the tract to which the breed is indigenous. Though we have few places from where we can obtain bulls of known pedigree, no difficulty is likely to be felt in obtaining a sufficient number of pure-bred non-pedigree bulls to meet the demand for which donations have so far been received.

This work is now scattered in every taluka of the Presidency which has made it impossible for the Live Stock Expert and his small staff to supervise this work. It has, therefore, become essential that the territorial Deputy Directors take over most of the ordinary supervision leaving the more technical side of purchase and registration to the Live Stock Expert. The Live Stock Expert and his staff will also take steps to arrange for the supply of suitable breeding bulls to meet future requirements.

Early in July 1936 His Excellency the Viceroy's appeal was followed up by a press communique issued by the Government of Bombay describing the lines on which the Government of Bombay are providing assistance and advice to the intending donors of bulls or money. Under this scheme an account has

been opened in the Imperial Bank of India, Poona, called "Live Stock Improvement Scheme" in the name of the Director of Agriculture. The wishes of donors who desire that their contributions should be utilized in any particular area or in any particular way will be respected. Failing such instructions all donations over Rs. 200 will be utilized, as far as possible, for the purchase of bulls and sums under that amount for maintenance.

Up to 30th June 1936, offers of six bulls and choice of a number of bulls from a Panjrapole in Kathiawar were received.

Live Stock Improvement Act.

The Live Stock Improvement Act has been brought into force in four villages—two in East Khandesh and two in Dharwar District. These villages are being inspected and notices for the castration of undesirable bulls being given to their respective owners. The District Local Boards, Ahmedabad, Dharwar and Sholapur, have been approached for their approval to enforce the Act in other villages.

Premium Bulls.

The whole of the livestock work has continued to be concentrated in cattle centres throughout the Presidency under the control of the Live Stock Expert to Government. The following table shows the position of premium bulls in different divisions during the year :—

Division.	Number of bulls 1st July 1935.	Working on 1st July 1936.
South Central	69	71
North Central	68	67
Southern Division ..	62	75
Gujarat	80	76
Total ..	279	289*

* Out of this number, the period of 97 bulls has expired during the year.

The above number includes 7 buffalo-bulls put out in the districts—4 in the Northern Division and 3 in the Southern Division.

Besides this, the Live Stock Expert put out the following animals from the Village Improvement funds :—

27 bulls.
64 cows.
3 cow heifers.
9 bull calves.

The following table shows the number of pedigree stock registered during the year in each of the main breeds :—

Breed.	Number of animals registered.
Khillar	55
Gir	98
Kankrej	122
Amrit Mahal	59
Nimari	..
Surati Buffalo-bull	1
	335

This brings the total of registration of all breeds to 2,084.

Poultry.

The following statement compares the number of stud cocks put out during the last two years :—

Division.	Year 1934–35.	1935–36.
Northern (including Bombay Suburbs)..	42	36
North Central	51	49
South Central	84	174
Southern	6	24
Indian States	9	26
Total ..	192	309

Besides, 199 cocks were put out under the Village Improvement Scheme.

The Bombay Presidency Poultry Association.

The Bombay Presidency Poultry Association has continued to do good work during the year. It held its Annual Poultry Show in December 1935 in the Southern Command Gymnasium, Poona. The Show was a great success. There were 424 entries for judging. It is gratifying to note that the Association is paying greater and greater attention to the Indian-bred stock.

Palghar Dairy District Scheme.

It was reported last year that out of the total area of 1,054 acres set apart for the above scheme, 500 acres of land have been leased to a Bombay firm. During the year under report Government have been pleased to lease 8 acres and 28 gunthas to the same Bombay firm and 537 acres and 10½ gunthas to another Bombay firm on certain terms and conditions. The plans and estimates for the construction of the necessary buildings on the site are under preparation by the lessees and the actual working of the scheme is expected to commence in the near future.

Owing to a large demand for land under this scheme, Government are considering to set aside additional area of about 1,000 acres for the purpose.

The Gujarat Boll-Worm Clean-up Scheme.

The Gujarat Boll-Worm Clean-up (Plant-puller propaganda) scheme was first sanctioned by the Indian Central Cotton Committee in August 1933 for a period of four months from March to June 1934 for Broach and Surat Districts. As a result of good work done during that period, the scheme was extended for two more seasons, i.e., March to June of 1935 and 1936. The 1935 season's work has already been described in the last year's report on page 21.

During the year there was a severe frost in January 1935 and the propaganda work received a set back as the cotton crop was severely damaged and the cultivators were disheartened. However, in order to keep up the continuity, 15 Kamgars were employed in Broach and 9 in Surat Districts. The clean-up propaganda in Jambusar Taluka of Broach and in the Surat tract was taken up rather late with the result that the progress made in these areas has been rather small. As many as 2,271 plant-pullers were sold in the whole of Broach and 739 plant-pullers in the Surat tract. The following table shows the areas uprooted with plant-pullers and Kudalies and areas hacked with Kudalies in Surat District and Broach District :—

Surat District.

	Total area	Area up-rooted with plant puller	Area uprooted by Kudalies
(British tract lying South of the river, Nerbudda) ..	256,254	88,221 (34·4%)	168,033

Broach District.

Taluka	Total area cleaned	Area uprooted with plant-pullers	Area uprooted with Kudalis	Area hacked with Kudalis
	Acres	Acres	Acres	Acres
Broach	58,204	55,700	2,082	422
Amod	49,061	43,411	3,265	2,385
Vagra	40,650	38,408	....	2,242
Jambusar	80,995	5,777	....	75,218
Total ..	228,910	143,296	5,347	80,267

During the year by the end of May, 98 per cent. of cotton stalks were removed in the whole of Broach, Wagra and Amod talukas; while 86 per cent. were removed by 19th May in Jambusar Taluka.

PROTECTION OF CROPS AGAINST WILD ANIMALS.

The posts of the Shikar Officer and his Assistant have been continued for another year and the Graduate Assistant appointed in Mr. Bhide's vacancy continued to concentrate on the Gun-club work in the Southern Division, with headquarters at Dharwar from April 1st, 1936.

The total number of animals killed during this year was 661 of which 648 were pigs and 13 nilgais. The following are a few notes on the various organized groups.

Poona District.

The work started in 1925 in Sinhagad area is now being pushed on and extended in the first instance in Haveli Taluka and then in the other talukas of Poona District, and the Deccan Agricultural Association has offered its co-operation in this respect. A sum of Rs. 300 out of the Rural Uplift grant was allotted by the Collector of Poona for this work and a scheme for payment of rewards per pig killed by cultivators has been prepared and the usual rates, viz., Rs. 2 for a big boar, Rs. 1-8-0 for a sow and annas 8 for a squeker have been adopted. Plans for organising 5 major and 3 minor crop-protection clubs were discussed in a meeting at Shivapur on February 22nd, 1936, when Dr. W. Burns, the Director of Agriculture, was present. Much practical work was done

and 101 pigs were killed and rewards granted. The severe unfavurable seasonal conditions seem to have increased the pig trouble to the cane crops in the Right Bank Mutha canal area.

Satara District.

Palshi Group Gun-club.—A scheme in full co-operation with the Forest Department is being worked here.. This scheme aims at solving difficulties connected with the pig campaign by the cultivators. Formerly all cultivators were not contributing for the Gun-club work and, therefore, it was decided that the grass area required for the group should be handled by the Gun-club and the Gun-club should arrange to charge a little extra for the grass required by each member so that the surplus can be utilized for expenditure on the Gun-club work. The subject was discussed initially with the Chief Conservator and then with the Divisional Forest Officer, Satara. The details of the scheme are as follows :—

Grass in the area of operations of this club was sold on cutting terms to the Gun-club committee at a concession rate of Rs. 100. Recoveries at suitable scale per sikle in the 3 villages came to Rs. 167-8-0, thus leaving a margin of Rs. 67-8-0, which was spent on the Gun-club work. In 18 hunts 34 pigs were secured and an area of 200 acres of crop was protected.

Nagar District.

Disappearance of prickly pear due to cochineal insects has probably driven the pigs to the crops and has increased the damage to irrigated crops this season only in the canal tracts. The damage is being further heightened by the unfavourable seasonal conditions and thus the work of the control of pigs on the canal tract has become more difficult and attempts are on foot to station a complete Shikar party paid entirely from the Irrigators' Fund collected at their request by Government at 1 pice per rupee on the irrigation cess. However, the clearance of prickly pear will make the kill easier.

Godavari Canals.—The Gun-club did not want any campaign in summer as was done hitherto owing to very few pigs being left in the tract. In August and September 2 shikaris were posted, one at Takli centre and the other at the Government Experiment Farm at Kopergaon, and they secured 13 pigs on the groundnut areas in the tract. The Bhima Cup Meeting at Manjur was run successfully third time this year and 7 pigs secured. The following is an extract from the Secretary's report to the Director, " Our thanks go to Dr. Burns of the

Agricultural Department whose interest and assistance did in the first instance inaugurate the meeting and to his able assistants (subordinates), Mr. Bhide and Mr. Dhumal, to whose presence in camp and whose untiring efforts in making the beating arrangements are due much of the success."

Pravara Canals.—The Maharashtra Sugar Mills requisitioned the services of three shikaris for work on their area and contributed Rs. 75. The shikaris secured nine pigs.

The Belapur Sugar Factory also requisitioned the services of a shikar party and work was started in June; but owing to an accident to a Vaidu after the fourth day's work on which 15 pigs were killed the work was temporarily closed and was begun again in August and one pig was killed. Large concentrated blocks of cane are difficult to hunt and it seems necessary to ask these Factory people to manage the work themselves as the Department cannot spare either guns or shikaris for long periods.

Dharwar District.

One more Gun-club, namely, Varah Group Gun-club, was organised at Varah in Hirekerur Taluka under the auspices of the Taluka Development Association, Hirekerur, and this, with the four Gun-clubs, referred to in the last year's Annual Report, continued to do good work.

	Pigs.
(1) Arwatgi Group secured	111
(2) Kalkeri ,, ,, ...	61
(3) Hulkop ,, ...	83
(4) Alnavar ,, ,, ...	29
(5) Varah ,, ,, ...	3
Total ..	287

The Collector was pleased to sanction the following grants from the Rural Uplift Funds :—

	Rs.
(1) Arwatgi Group secured	50
(2) Hulkop ,, ,, ...	29
(3) Kalkeri ,, ,, ...	19
(4) Alnavar ,, ,, ...	10
Total ..	108

The last named Gun-club, namely, the Varah Group was organized at the request of the Honourable Minister for Education.

Belgaum District.

The three Gun-clubs in the Chandgad Mahal, namely, Turke wadi, Utchali and Kolindre (under the Turkewadi Crop Protection Society) and also one in the Khanapur Taluka, namely, Kakeri continued to work. Kakeri secured 21 pigs. During the year three more clubs were formed at Khanapur, Mundgod and Bidi with a central committee at Khanapur, two more Gun-clubs in Chandgad Mahal with Here and Kanur as centres and one Gun-club in Hukeri with village Daddi as centre.

Turkewadi Crop-protection Society, including Turkewadi, Utsali and Kolindre killed, 46 pigs. The Khanapur Taluka Committee could not start work properly till late in the season and it secured ten animals.

Karwar District.

In this District one Gun-club at Tergaon was formed which secured 30 pigs, and another was formed at Sambarani in Halyal Taluka. Sambarani Club secured one pig in June 1936. The organisation of a third club at Tatwani is under contemplation and the preliminary arrangements for the formation of a Sub-committee have been completed.

Including the above, there are 19 Gun-clubs at present covering 143 villages. The people are found to love hunting very much and co-operate heartily in giving personal labour, but it seems necessary to give some grant-in-aid to cover expenditure on ammunition, correspondence, etc.

North Central Division.

The Deputy Director arranged to spare for a part-time the services of the District Agricultural Overseer, East Khandesh, for organising a model Gun-club in East Khandesh with Salsingi village as centre in the Bhusaval taluka. The Shikar staff concentrated their attention on the following works in East Khandesh :—

1. Preliminary survey for organising a chain of Gun-clubs in East Khandesh in the following talukas :—

(1) Edlabad Peta,
(2) Raver Taluka,
(3) Bhusaval Taluka,
(4) Jalgaon Taluka.

2. Personally convincing the Collector, East Khandesh, about the necessity and utility of the work and securing Rs. 500 from the Village Improvement grant.

3. Fixing up of a suitable centre for the first Gun-club of its kind in East Khandesh.

4. Formation of Sub-committees by visiting most of the nine villages proposed to be included in the Salsingi Gun-club.

5. Subsequent permanent organisation of central committee and the final formal opening of the Institution under the Presidentship of the Deputy Collector, East Khandesh.

6. Preparation of actual plan of campaign and the budget of expenditure.

7. Actual start and conducting of the hunting work and giving necessary help at various stages of organisation.

During the two months of the campaign with 28 working days 86 wild animals, including 73 pigs and 13 nilgais, were secured at a total cost (including ammunition) of Rs. 180, or at an average cost of Rs. 2–1–6 per animal killed, the scheme being for the protection of about 2,000 acres of cultivation.

The work of this first Gun-club and the benefit derived therefrom have appealed to the surrounding villages and there are at present 18 applications which are pending for starting such work. These villages have undertaken *to find the finances for their work by contributing at the rate of* 1 *pice per rupee on land revenue* (including local cess) as was done by the Salsingi Gun-club villages.

Policy of Shikar Work.

The policy of Shikar work as detailed on page 24 of last year's Annual Report was continued and the Deputy Directors of Agriculture concerned, specially those of the Southern Division and the North Central Division, continued to take personal interest in the work. The Gun-clubs are now working under the control of these officers, the special Shikar staff providing expert guidance and help from headquarters.

Co-operation with other Departments.

The essence of the Shikar work is the co-ordination with the other Departments. The Chief Conservator of Forests, Mr. Gilbert, has been exceedingly helpful and has thoroughly approved the way in which the work is being done under strict control for the protection of crops only. Co-operation of the Revenue and the Police Departments is gladly given and all this has made the working of all Gun-clubs smooth. In

addition, the Deccan Agricultural Association, with its head-quarters at Poona, has undertaken the pig destruction work in the Haveli Taluka and the Shikar Officer and the staff worked in closest co-operation with the Deccan Agricultural Assocation.

Collectors have come forward and have given grants from Village Improvement Funds for purchasing ammunition, for giving rewards for killing pigs and for demonstrating the utility of pig campaign, specially in East Khandesh.

Fruit Inspection.

During the year the Plant Pathologist to the Government of of Bombay and the Professor of Entomology, College of Agriculture, Poona, jointly inspected consignments of mangoes, vegetables, flower seeds, plants and grafts and root cuttings shipped from Bombay to Europe and issued 37 certificates when the materials were disease-free. Of these, 26 consignments were inspected in Bombay and 11 in Poona.

CHAPTER III.

AGRICULTURAL RESEARCH.

1. SUGARCANE RESEARCH SCHEME FOR DECCAN, PADEGAON.

(*a*) *Soil Physics Section.*—With the completion of the genetic survey of the Pravara canals nine soil types have so far been identified. Studies on the processes of soil formation have revealed the degree of weathering undergone by various soils and the close relationship between soil types and the chemical composition of the parent material. In the soil fertility surveys effects of cane growing on the physico-chemical properties of soil have been summarised and tentative conclusions drawn on the basis of statistical analysis of data. Soil fertility studies at the farm have given useful indications in the evolution of practical measures such as increasing the availability of phosphatic fertilizers and in the enhancement of the beneficial effects of fallows and rotations. Further progress has been made on the reclamation of chopan soils and in the proper understanding of the nature of soil degradation in general. Interesting results are now available on the causes of non-response of farm yard manure in certain soils and their relationship with the soil microflora with suggestions for simpler means of amelioration of spoilt lands.

(*b*) *Crop Physiology Section.*—Further research in the Bioclimatics has shown that other factors as velocity of germination and fluctuation in the sub-soil water table exert their influence on the crop growth and thus mask the effect of climate to some extent. Humidity is also found to accelerate the activity of the top borer. The incidence of its attack is, however, greatly reduced in case of early vigorous germination. Detailed investigations in the movement of soil moisture have revealed that from the standpoint of water requirement the early grand period stage (mid-May to end of June) is the most critical period in the event of the late approach of monsoon and it is at this stage that the treatment of 70″ falls definitely short of the crop requirement. On the other hand, heavy irrigation of 130″ necessitates higher manuring as it leads to both leaching down the soluble nutrients and checking of the activities of the soil microflora. On the manurial side, the findings on the periodical mineral requirement of the crop have been tested in a replicated trial with promising results. Experiments with varying quantities up to 300 lbs. N. have shown that from the standpoint of yield and mineral in-take the optimum dose has not been reached and investigation is, therefore, in progress with

still higher doses up to 600 lbs. N. The germination studies have also yielded information of great practical value as regards the selection of buds and optimum field conditions. Investigations are also in progress on the utilisation of trash and molasses by direct incorporation in the soil as well as on the factors affecting the quality of gul.

(*c*) *Agricultural Management Section.*—In this section amongst the Coimbatore varieties under study, varieties Co. 360 and Co. 290 have retained their reputation for tonnage and sugar adaptability to all kinds of soil and different periodical plantings. Varieties Co. 419 and Co. 413 have surpassed Co. 360 and Co. 290 in yield at two different times of plantings —October and January. Co. 419 is liberated for multiplication and further trials in the district. Amongst early group Co. 407 and Co. 408 have stood well for October planting as against January. In non-flowering varieties H.M. 320 has shown its superiority in yield over Pundia and E.K. 28 under all seasonal conditions and can be considered as cultivator's cane for gul making for the specific class of cultivators who are in need of tops. Amongst the new arrivals Co. 421 and Co. 426 are in the forefront. Sugarcane Sorghum Hybrids have behaved like last year. In manurial experiment, nitrogenous top dressing dose of 150 lbs. N. was traced to be inefficient for the production of normal crop under adverse climatic conditions. Addition of superphosphate has corroborated last year's results.

Cold Storage Research.

The Cold Storage observations on the mango and the Nagpur orange were continued during the year 1935–36. It was conclusively proved that the suitable range of temperatures for storing the Alphonso mango for commercial purposes lies between 45° and 48°F. Observations on the influence of locality on the storage quality of fruit revealed that the Alphonso mango grown under different climatic and soil conditions did not show any substantial difference in its behaviour in cold storage.

A large number of other selected varieties of mango from different provinces was received for cold storage trials during the year. The following varieties were found to give promising results—

1. Peter from the Madras Presidency.
2. Fazari Zafrani from the United Provinces.
3. Pyree from the Bombay Presidency.
4. Cowasjee Patel from the Bombay Presidency.
5. Fernandez from the Bombay Presidency.

Cold storage trials of the Santra or the Nagpur orange were also carried out during the year. Fruits of different stages of maturity, viz., "green", "turning" and "yellow" were used in the experiments and stored at 35°, 40°, 45°, and 52° F. The observations showed that fully ripe and yellow Nagpur oranges could be kept in good condition for 10 to 12 weeks at 40° F. without any appreciable wastage.

During the year the Imperial Council of Agricultural Research has extended the sanctioned period of the Cold Storage Research Scheme. Problems concerning the cold storage behaviour of Malta orange, banana, seed potato, etc., have been included in the future programme of work.

THE DRY FARMING RESEARCH SCHEME.

This was the second year during which full programme of research in three sections was carried out. The total rainfall during the year was nearly normal but its distribution varied very much from the normal. The rainfall was characterised by some very heavy falls received in a few hours.

Work in the soil section.—Profile studies of soils at Sholapur and Bijapur have been completed. Further progress has been made in studying some important soil constants like the moisture equivalent and the hygroscopic coefficient. These properties are likely to be of great use in dry farming work. In addition, various other investigations like the Nitrogen recuperation at Sholapur and Bijapur, the rate of decomposition of *Murum* and movement of moisture in the soils under different treatments are being carried out.

Investigations into the disposal of rain-water is continued. Loss of rainwater by surface runoff was fairly large during the year. But the quantity of soil removed by the runoff water was simply colossal this year. One of the plots lost at the rate of 115 tons of soil per acre. The amounts of fertility elements lost in solution in water and also in silt have been determined. Loss of rainwater by evaporation is found to be very great.

Physiological work on jowar-plant.—(*a*) Water requirement of three jowar strains was found out during the year in larger replications. One variety has been found to be distinctly efficient in its utilization of water. (*b*) Addition of farm-yard manure increases the efficiency of the plant in its utilization of water. (*c*) Presence of larger quantity of water decreases the efficiency of the plant and gives a high transpiration coefficient.

The jowar-plant has been analysed at four stages to understand how the plant feeds. Mineral-plant-food requirements of the jowar have also been studied.

Field-work.—Intensive field-experiments by Fisherian technique have been carried at both the stations—Sholapur and Bijapur—to determine the value of various factors involved in the method of dry farming. Several inhibiting factors like the jowar stem-borer, sugary-secretion and heavy down-pour of rains at the seedling stage have reduced the yields at both the stations. But better cultivation, manuring with sann or farmyard manure and sheep folding have given much increased yields. The economics of the method is being studied on a larger scale at both stations and operations are being so adjusted as to bring the method within the means of the ordinary farmer.

Khandesh Cotton Breeding Scheme.

This is the fourth year of the scheme. It is partly financed by the Indian Central Cotton Committee and partly by Government. The three promising strains of *Neglectum verum*, viz. N. V. 57-7, N. V. 56-3 and N. V. 56-17 referred to on page 28 of the last year's report were again tried for their yield in replicated plots on the Jalgaon Farm. On Dhulia and Bhadgaon farms the verum strains N. V. 57-7 and N. V. 56-3 were similarly tried, the variety N. V. 56-17 being omitted for want of sufficient seed. The variety N. V. 57-7 gave significantly higher yield than N.R. and Banilla on the Jalgaon farm only, but its yield results have not been encouraging on the Bhadgaon and Dhulia farms. N. V. 56-3 has, however, done fairly well in most of the trials and has yielded higher than Banilla and about equal with local cotton on the Bhadgaon and Dhulia farms. These verum strains show better resistance to wilt than local varieties. They are also finer in staple and are superior in spinning to Banilla as well as local. They spin from 35's to 40's counts.

Wilt work at Poona.—A number of N. V. selections were tested in pots, but all died of wilt. Million Dollar, a strain of *Gossypium neglectum*, was tested in single pots at 22–25° C for a period of 45 days. 72 plants survived out of a population of 104 and of the survivals, 55 plants have produced a sufficient number of bolls and 17 plants died in the field. The total quantity of 1,836 seeds produced by 55 plants was tested in pots in 1936 and about 140 plants free from leaf mottle have been obtained and transplanted in the field. The object of this work is to secure a wilt immune cotton of neglectum type for a cross with the best Khandesh cottons.

Broach Cotton Breeding Scheme.

The Cotton Breeder, Broach, has obtained a new strain, namely, New Selection 49 out of the selections made during the

last three seasons. This is wilt resistant in the field and possesses other desirable characters. This will be tested in Poona.

Crosses.—Out of the crosses, the cross B. D. 8 with G. A. 26 F5 has given some very promising selections having staple length of more than 22mm and showing silkiness of the fibre and good ginning and some of these are either free from wilt in the field or show a small percentage of wilt. N. S. 49 and the cross B. D. 8 X G. A. 26F5 will be grown for yield tests in comparison with B. D. 8 and N. S. 12 and will be sent out for spinning tests.

WILT WORK IN POONA.

(*a*) *B. D.* 8.—In 1932 a large number of selections of B. D. 8 furnished by the Cotton Breeder, Broach, were tested in pots but only 22 plants survived. These were transplanted in the field and selfed. The seed of each plant was again tested in pots in 1934–35. Of these, B. D. 8-6 and B. D. 8-26 remained free from wilt. In 1935 the progenies of four plants of B. D. 8-6 and 9 of B. D. 8-26 were tested in single pots kept at about 25°C. These were observed for 45 days and out of a population of 710 plants tested, only 38 plants survived at the end of 45 days. Out of these, 26 were absolutely free from leaf mottle which is an early symptom of wilt. All these 38 plants were transplanted in an infected bed in September 1935 and these produced a large number of bolls. These plants were further examined for root discoloration at the end of the season and 23 plants showing discoloration were rejected. The seeds of the remaining 15 plants (totalling 13,500 seeds) were tested in 1936 in pots in a specially constructed glass-house under the optimum conditions of wilt infection. After a period of 45–50 days, only 32 plants were free from mottle, and these have been transplanted in the field.

(*b*) *New Selection* 12.—Five cultures of this selection were tested in 1933-34 in Broach and many plants had survived and remained free from leaf mottle. This selection does not show vein discoloration but only a slight yellowing of a small portion of the cotyledons. Progenies of the three best cultures were tested in Poona in 1935, and out of a total population of 1,000 plants only 51 free from mottle survived and were transplanted very late in the season. Of these plants, 16 were rejected at the end of the season as they showed root discoloration. The seed of the remaining 35 plants (totalling about 18,000 seed) was tested in 1936 in the glass-house, and 15 plants free from mottle have been obtained although there is a portion of the seed still to be tested.

It is gratifying to note that the Indian Central Cotton Committee, at its meeting held in August, approved the extension of the above schemes for another five years.

Further Schemes.

None of the four schemes, viz. (1) scheme for investigation of problems of sann-hemp cultivation, (2) poultry breeding scheme, (3) goat breeding scheme and (4) the virus diseases research scheme were started during the year, as no funds were allotted by the Imperial Council of Agricultural Research.

During the year under report the following new schemes approved by the Provincial Agricultural Research Committee and put up to the Advisory Board of the Imperial Council of Agricultural Research were approved :—

(1) Scheme for research in Agricultural Economics by the Gokhale Institute of Politics and Economics, Poona, costing Rs. 30,030, spread over a period of 2 years.

(This scheme has been approved subject to the contribution of half the cost of the scheme.)

(2) Scheme for investigation into the attack on jowar by the parasite "Striga" put up by the Bombay Department of Agriculture, costing Rs. 27,060, spread over a period of 5 years. (This has been approved subject to the Bombay Government contributing Rs. 5,412).

(3) Scheme for the improvement of papaya breeding and cultural practices, costing Rs. 6,000, spread over a period of 5 years, put up by the Bombay Department of Agriculture.

(4) Scheme to test the value of different methods of controlling or eradicating ticks, costing Rs. 59,485, spread over a period of 5 years, put up by the Director of Veterinary Services, Bombay Presidency.

(5) Scheme to investigate the changes into the Microflora of kalar soils in Sind costing Rs. 21,672 spread over a period of 4 years put up by the Sind Agricultural Department.

The following schemes were rejected by the Advisory Board of the Imperial Council of Agricultural Research :—

(1) Scheme for the study of the Deccan Wingless Grasshopper.

(2) Scheme for investigation into the attack on tobacco by the phanerogamic parasite "Orobanche".

(3) Scheme for research in Economic Ornithology by Mr. Salim Ali.

(4) Scheme for research in groundnut breeding in the Bombay Presidency.

Extension Proposals.

Proposals for the extension of the Sugarcane Research Scheme for the Bombay Deccan and the Cold Storage Research Scheme, Bombay, costing Rs. 2,48,354 for a period of 5 years and Rs. 50,188 for a period of 3 years, respectively, were sent to the Advisory Board of the Imperial Council of Agricultural Research at their July 1936 meeting and these proposals have been approved subject to the proviso that in the case of the sugarcane scheme the Bombay Government would contribute half the cost. Similarly, the Advisory Board approved of a scheme for gas storage of fruits and vegetables costing Rs. 11,019, spread over a period of 3 years, the experiments to be conducted at the Ganeshkhind Cold Storage Research Station, the cost on account of this scheme as well as the Cold Storage Extension Scheme being met entirely from the funds of the Imperial Council of Agricultural Research.

Cotton Crop Forecast Improvement Scheme.—This scheme was sanctioned by the Indian Central Cotton Committee for a period of 2 years in the first instance and it was actually launched in June 1934. During the year under report the Indian Central Cotton Committee sanctioned its extension for a further period of 3 years, i.e., up to June 1939, and recommended that after the scheme is ended the Government of Bombay should continue the work in the Presidency at their own expense and include other crops as well for investigation.

The difficulties reported last year, namely, incorrect reporting of areas in bighas instead of in acres, non-reporting of estimates for unsurveyed villages, incorrect calculation of anna valuation, incompleteness of mill returns, etc., still continued. The form for mill return prescribed under the Indian Cotton Cess Act of 1923 has been suitably modified as suggested by the Indian Central Cotton Committee and it is hoped that these returns will now be complete and reliable.

The Provincial Officer in charge of the scheme visited some 65 stations (besides a number of villages) in the different divisions of the Bombay Presidency, Sind and in the Indian States for which information is included in the Bombay Cotton Forecasts.

Agricultural Machinery.

Tractor and its suitability to Indian conditions.—Tractor has been found suitable for ploughing operations either for breaking the new land or for removing deep rooted weeds like hariali as in the case of the Karnatak where a McCormick Deering Crude Oil Tractor of the tract-type having 52 H. P. named 40 T. D. with the Rud Sack Deep Tillage three-mould board plough has been ploughing black cotton soil to the depth of 12 inches. This work was done by the Karnatak Agricultural Transport Company on hire for the local cultivators at a cost of Rs. 18 per acre. Government arranged to give tagai loans to those cultivators who wanted their lands to be ploughed for the removal of hariali and as much as 418 acres were got ploughed with the aid of tagai loans and 348 acres on cash payment by various cultivators. One set of tractor ploughed from 8 to 10 acres of land in a working day of 22 hours.

In the West also it is found that a tractor gives best results only in specialized forms of cultivation where temporary periods of high pressure of work alternate with long periods of rest. It also requires a large area for its working in a year. If the area is limited for cultivation it is difficult to run tractors profitably, as even in the West it has not been found possible to construct tractors that would be suitable for small farms and animal traction on small farms still continues to be used in preference to mechanized traction. Besides, the density of population resulting in a surplus rather than a deficit of labour has also been responsible for less use of tractors in some European countries. However, there is one more possibility of the use of tractor, viz., for cultivating clean land to a depth of 3 inches by means of a cultivator soon after the crop is harvested at a small cost of a rupee or two per acre if any contractor takes up this work on hire in Khandesh or Deccan.

Seed Drill.—The question of designing a suitable seed drill, costing not more than Rs. 50, has been engaging the attention of the Department for many years and now that the Agricultural Engineer has succeeded in designing one, it would not be out of place to trace the history of the drill.

The Handbook on Research of the Bombay Department of Agriculture. 1931, has noted that Mr. Schutte was able to design a seed drill with the help of the Director of Agriculture and the Deputy Directors of Agriculture. The Schutte drill was generally satisfactory but was heavy in draft. The drill was

designed to suit all kinds of soils, all kinds of crops and different seasons by providing a combination of arrangements in the drill. This made it rather heavy in weight and consequently in the draft too. Its weight was 400 lbs. and the draft varied from 160 to 180 lbs. This matter was discussed in "CRESCO" in 1932 wherein Mr. B. S. Patel, Deputy Director of Agriculture, Gujarat, suggested that it was difficult to produce an universal drill which would satisfy all conditions, but if an attempt is made to design a drill for one tract by providing the seed regulating arrangement on the ordinary wooden drill, we might succeed. It was also decided to design a drill for the Dharwar tract in the first instance. Accordingly, the Agricultural Engineer, in the first instance, modified the Schutte drill by lightening it to half the original weight and the trials taken in 1933 gave good regular sowings and the draft was somewhat reduced. However, further trials in 1934 season showed that it could not work in wet soils so it was suggested that the drill should be fitted with a more efficient self-cleaning device for the wheels. However, the trials taken in 1935 showed that the draft was still high, i.e., 115 to 130 lbs. under normal conditions of soil and 150 lbs. under wet conditions. Rao Bahadur S. S. Salimath, Deputy Director of Agriculture, Southern Division, suggested that the draft should be reduced to 100 lbs. so that it can sow 10 to 12 acres a day in kharif season. It is gratifying to note that the Agricultural Engineer, Mr. C. G. Paranjpe, has been able to reduce the weight and the draft by fitting the local drill with the automatic lifting and sowing attachment. The draft of the drill now ranges from 70 to 80 lbs. for a two-coultered drill and 90 to 100 lbs. in the case of a three-coultered drill for sowing at an average depth of about 2 inches. This drill weighs 146 lbs. in the case of a two-coultered drill and 169 lbs. in the case of a three-coultered one. The old rope-drive for the seed box has now been replaced by a chain-drive. The trials at Dharwar and roundabout in sowing cotton were very successful.

Wheat Thresher.—The introduction of the Gujarat wheat thresher has practically solved the problem of threshing wheat economically. It has superseded the several indigenous and other methods of threshing, such as, treading the stuff by cattle, working carts over it or threshing it with the Olpad or Norag thresher. The machine is mounted on a steel frame and consists of 12 or 15 serrated discs, spaced at suitable distances and fixed on three parallel shafts, each taking either 4 or 5 discs according to circumstances. The discs are $\frac{1}{8}''$ thick and 18″ in diameter and arranged in a zig-zag manner with suitable

flanged distance pieces, which, not only give more clearance, but make the removal of discs very easy for sharpening. The machine is provided with a seat for the driver and a draw bar for hitching purposes. It costs about Rs. 60 and can be easily drawn by a pair of bullocks. Thus it saves not only power but saves injury to cattle employed in treading. Its greater capacity enables the farmer to employ his extra cattle elsewhere, finish his threshing in the limited time at his disposal and if possible help his neighbour also. The output of the machine is found to be as under when compared with other methods :—

——	Gujarat No. 1.	Treading by cattle.	Working of cart.	Norag thresher.	Olpad thresher.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Output per day of 9 hours.	6,836	6,417	3,529	4,850	4,000

(*Note.*—In the case treading by cattle 3 men and 10 bullocks were employed, whereas in all the rest of the methods only 2 men and 2 bullocks were employed.)

Ball bearing bullock cart wheels.—Rubber tyred wheels for the bullock carts are being recommended and a great controversy has arisen as to its suitability for ordinary field cart for general use. It is rather a far cry to suggest the introduction all at once of rubber tyred wheels for carts for general use in the villages, but it was considered that perhaps the fitting of the ordinary carts with wheels mounted on ball bearings might give material advantage in the draft required to draw an ordinary load, and as reported in the last year's report, page 202, the Agricultural Engineer to Government tried out the ball bearing wheels and during the year 5 such carts were supplied to different officers in the district as well as in Poona for exhaustive tests. These tests have shown that the carts work without any difficulty and the ball bearing wheels carry nearly double the weight compared with the cart having ordinary wheels, the draft required remaining the same. The Agricultural Engineer has also devised a simple contrivance for fitting the ordinary wheels with ball bearings. The local cart will have to be fitted up with a turned axle and ball bearings. The axle, ball bearings and the brake will cost about Rs. 50. It is also found that these wheels do not wear so much and require less attention for oiling and cause less jolting.

Soil Erosion.

Recently great demand has come up for bunding and stoppage of soil erosion. The Dry Farming Research Station at Sholapur has brought out vividly the enormous loss we are suffering from soil erosion by heavy downpours on slopy tracts as well as so-called level tracts which are not absolutely level. This subject has been thoroughly investigated by the United States of America and special efforts are being made to save this huge loss in that country. We have no data as to the actual effect of erosion on various kinds of soils and to investigate this subject the Professor of Agricultural Engineering, Physics and Mathematics at the Poona College of Agriculture, has taken up research work on soil erosion both in Poona and in the district.

CHAPTER IV.

AGRICULTURAL EDUCATION.

The Poona College of Agriculture is as popular as ever in spite of the increase in fees. The competition for admission to the College continued to be keen. There were in all 130 applications for admission, 20 of which were from outside the Bombay Presidency. Of these, 93 and 11 were, respectively, selected and ultimately 73 from the Bombay Presidency and 5 from outside joined the College.

The new courses for B.Sc. (Agri.) which were introduced during 1933-34 reached the final year stage in the session which commenced in June 1936. The old course, viz., B.Ag., was taught for the last time. The introduction of the new courses has necessitated certain modifications and fitting up of the Botanical Laboratory and an additional botanical laboratory has been improvised in a part of the herbacium. This is by no means complete and a five year plan for further fitting the laboratories has been approved by Government.

Three students were enrolled for M.Sc. degree and one for M.Ag. degree.

Special Courses.—The Department also imparts special training on various subjects at various institutions located on the College Estate, for example, 3 students were trained in crop protection, 5 in dairying, 1 in entomology, 3 in horticulture, 1 in plant pathology, 2 in practical veterinary and 12 in practical poultry farming. The Agricultural Engineer received 27 applications for admission into the Oil Engine Class out of which only 10 attended and received training in driving of engines and pumps. Special classes of short durations are also held in the district, e.g., the Horticulturist to the Government of Bombay held six classes in horticulture and the Deputy Directors of Agriculture held five classes in Agriculture, four in Agri-horticulture, one in poultry and two in sugarcane.

The Agricultural Graduates' Employment Bureau.—The Bureau has been functioning since 1934 with the Principal of the Poona Agricultural College as its ex-officio President. So far 85 graduates have registered themselves including 12 during the year under report. The Sugar Factories employed 30 agricultural graduates during the year. The widespread desire to reconstruct rural life of India has received further impetus from His Excellency the Viceroy and it is hoped that the next few years will see a great drive for the

improvement of rural life. This is bound to open up new avenues of service for our educated men and particularly for the graduates of Agriculture.

Vernacular Agricultural Schools.—The Devi-Hosur and Dhulia Vernacular Agricultural Schools continued to work satisfactorily. The Dhulia School is in great demand, but not so the Devi-Hosur school where in spite of a stipend of Rs. 5 each per month sufficient number of boys are not forthcoming. The Local Advisory Committee of the Dhulia school continued to do excellent work by way of securing funds for the boarding charges.

There is one more vernacular agricultural school at Rajapur in Ratnagiri district which is conducted by the Rajapur Shikshan Prasarak Mandali. The school has been in existence since 1929. This school supplies the want of agricultural education on account of the closure of the Government Vernacular Agricultural School at Jambul. The Rajapur school receives grant-in-aid from Government and this year it has secured Rs. 5,000 from the Sir Sassoon David Trust Fund. Besides training boys in agriculture and allied subjects, the school has taken up training of primary school teachers for Agricultural Bias Classes for Ratnagiri District and Sawantwadi State. The school is reported to be doing good work.

Agricultural Bias Classes.—There are in all 93 Agricultural Bias Classes, out of which 82 are being managed by the District Local Boards, 6 by Mission Societies and 5 by Indian States. With the exception of a few schools all are doing good work, especially so where they are kept under a supervisor. As usual the classes are inspected by the Inspector of Agricultural Schools. The schools are under the Educational Department.

Agricultural Education in High Schools.—Agricultural education has also attracted the attention of two high schools—one at Rajapur and the other at Bordi in Thana District—which have included special agricultural courses in their syllabus without affecting their usual course.

CHAPTER V.

ADMINISTRATION AND FINANCE.

The administration work of the Department has steadily increased within the last ten years as a result of many research schemes having been brought into operation and as a result of the successful ending of some of these research schemes already working. The Director of Agriculture has to attend two meetings of the Indian Central Cotton Committee in a year. Besides he has to work on the various sub-committees of the Indian Central Cotton Committee, viz., (1) Agricultural Research Sub-Committee, (2) Technological Research Sub-Committee, (3) Research Students Selection Sub-Committee, (4) Cotton Forecast Improvement Sub-Committee and (5) Special Sub-Committee on Wider Market for Indian cotton. Similarly the Director of Agriculture has to attend two meetings of the Advisory Board of the Imperial Council of Agricultural Research—one in Simla and one in Delhi. These meetings take lot of time of the Director and other Officers of the Department.

Moreover, the spread of the rural uplift movement all over the Presidency and the general interest aroused in the subject of Agriculture and its improvement has brought many agricultural schemes into operation. This coupled up with the recent appeal of His Excellency the Viceroy for the improvement of live-stock has thrown additional responsibility and work on the Director of Agriculture, the Live-Stock Expert and the Deputy Directors of Agriculture and others and it would not be wrong to say that the work of the district officers of the Agricultural Department has increased by about 50 per cent. in recent years. However, it is gratifying to note that the members of the Agricultural Department are willing to do their bit in this great move for the improvement of rural India.

Administration.

Dr. W. Burns, Director of Agriculture, Bombay Presidency, returned from leave on 25th October 1935, when Mr. B. S. Patel, who was officiating as Director of Agriculture, proceeded on leave for 8 months. Mr. V. G. Gokhale, Principal, Agricultural College and Professor of Agriculture, Poona, and Rao Bahadur D. L. Sahasrabuddhe, Agricultural Chemist to Government, Bombay, returned from leave on 7th December 1935 and 16th December 1935, respectively. Dr. Cheema continued to

act as Principal, Agricultural College, Poona, in addition to his own duties of the Horticulturist to Government, Bombay, and Mr. R. Y. Hulkoti, Acting Cotton Superintendent, S. M. C., Dharwar, continued to act as Professor of Agriculture, Agricultural College, Poona, up to 6th December 1935 vice Mr. V. G. Gokhale, on leave. Mr. N. Narayana, Assistant Professor of Chemistry, continued to act as Agricultural Chemist to Government, Bombay, up to 15th December 1935 vice Rao Bahadur D. L. Sahasrabuddhe, on leave. Mr. E. J. Bruen, Live Stock Expert to Government, Bombay, was in charge of the Marketing Survey work in addition to his own duties. Mr. C. S. Patel, Cotton Superintendent, Surat, continued to act as Deputy Director of Agriculture, Gujarat, Surat, up to 24th June 1936 vice Mr. B. S. Patel on deputation to act as Director of Agriculture and then on leave for 8 months. He (Mr. C. S. Patel) proceeded on leave for 1 month preparatory to retirement with effect from 25th June 1936. Messrs. L. S. S. Kumar and V. M. Chavan were confirmed in the posts of the Economic Botanist to Government, Bombay, and the Assistant Professor of Botany, respectively, from 17th April 1935. Mr. L. S. S. Kumar was on leave on medical certificate from 16th September 1935 to 10th January 1936 and Mr. V. M. Chavan, Assistant Professor of Botany, was appointed to act as Economic Botanist and Mr. S. R. Godbole, Agricultural Overseer, to act as Assistant Professor of Botany from 14th November 1935 to 10th January 1936. Mr. J. P. Trivedi, Professor of Agricultural Engineering, Physics and Mathematics at the Agricultural College, was on leave for 2½ months from 9th March 1936 and Mr. A. A. Vasavada, Agricultural Overseer, was appointed to act in that post. Khan Saheb F. J. Master, Personal Assistant to the Director of Agriculture, proceeded on leave for 6 months in the first instance with effect from 12th December 1935 and has extended his leave up to the end of March 1937 preparatory to retirement and his leave vacancy has been filled by the acting appointment of Mr. V. G. Kelkar, Senior Superintendent in the office. Mr. H. G. Baluch, Assistant Professor of Dairying and Manager, Agricultural College Dairy, who was granted study leave for one full year and ordinary leave for 55 days for training in the subject of Animal Husbandry in England and United States of America was granted an extension of leave up to 27th November 1936 and Mr. A. K. B. Cazi, Agricultural Overseer, has continued to act in that post. Mr. N. Narayana, Assistant Professor of Chemistry, was on leave for 1 month and 18 days with effect from 14th April 1936. Mr. M. L. Patel, Cotton

Breeder, South Gujarat, Surat, was on leave for 6 months from 9th December 1935 and Mr. A. K. Shah, Agricultural Overseer, was appointed to act in that post. Mr. V. R. Dharwarkar, Cotton Superintendent, S. M. C., Dharwar, who was on deputation in foreign service in H. E. H. the Nizam's Government for 7 years retired from Government service from 16th August 1935 and Mr. S. V. Shevde was appointed permanently in the vacant post with effect from the same date but remained seconded while on deputation as Cotton Superintendent, Banilla Cotton Scheme, Amalner. Mr. R. Y. Hulkoti was appointed to act as Assistant Professor of Agriculture, Agricultural College, Poona, with effect from 7th December 1935 and was on leave from the very date to 23rd December 1935. He was reverted to his original post of the Inspector of Agricultural Schools, Bombay Presidency, with effect from 3rd March 1936 when Mr. V. C. Pavate, who was acting as Inspector of Agricultural Schools, was transferred to act as Cotton Superintendent, S. M. C., Dharwar, and consequently Mr. K. S. Kulkarni, who was appointed to act as Cotton Superintendent, S. M. C., Dharwar, was reverted to his original post of the Assistant Professor of Agriculture with effect from 12th March 1936. Mr. G. P. Pathak, Agricultural Overseer, continued to act as Cotton Superintendent, Surat, vice Mr. C. S. Patel, acting as Deputy Director of Agriculture, Gujarat, up to 24th June 1936 and then proceeding on leave preparatory to retirement as stated above. Mr. S. B. Jadhav, Agricultural Overseer, continued to act as Divisional Superintendent of Agriculture, Deccan Canals, Baramati, vice Mr. G. P. Patil, on deputation to act as Professor of Agricultural Economics. Dr. V. N. Gokhale, Agricultural Overseer, continued to act as Assistant Professor of Chemistry up to 15th December 1935, vice Mr. N. Narayana, appointed to act as Agricultural Chemist to Government, Bombay, and subsequently on leave from 14th April 1936 to 31st May 1936. Mr A. R. Neginhal, Agricultural Overseer, continued to act as Assistant Professor of Agriculture, Agricultural College, Poona, vice Mr. K. S. Kulkarni, transferred as Cotton Superintendent, S.M.C., Dharwar, up to 6th December 1935 and vice Mr. R. Y. Hulkoti, Acting Assistant Professor of Agriculture, proceeding on leave from 7th December 1935 to 23rd December 1935. Mr. V. M. Majmudar, Agricultural Overseer, has continued to act as Cotton Breeder, North Gujarat, Viramgam, vice Mr. G. B. Patel, on leave abroad for 2 years and 4 months for training in plant genetics in America with the financial aid from the funds of the Indian Central Cotton Committee.

Rao Saheb Prayag, Dr. R. D. Rege and Mr. N. V. Kanitkar were on leave for short periods and no substitutes were appointed in their places.

Messrs. W. J. Jenkins, V. A. Tamhane, N. V. Kanitkar, Rao Saheb B. P. Vagholkar and Dr. T. G. Shirname continued to be on deputation during the year and the folllowing Officers were appointed in respective vacancies.

(1) Mr. K. V. Joshi as Deputy Director of Agriculture, N. C. D., Nasik.

(2) The post of the Soil Physicist to the Government of Bombay has been held in abeyance during the working of the Dry Farming Research Scheme financed by the Imperial Council of Agricultural Research.

(3) Mr. N. Narayana as Assistant Professor of Chemistry.

(4) V. V. Gadgil as Deputy Director of Agriculture, S. C. D., Poona.

(5) Mr. G. P. Patil acted as Professor of Agricultural Economics.

Finance.

The expenditure of the Department in the year under report was Rs. 11,69,996 as against Rs. 10,86,259 in the preceding year. The increase was mainly due to the (1) restoration of 5 per cent. emergency cut in pay; (2) annual or biennial increments in pay to officers and their establishments.

The receipts of the Department amounted to Rs. 2,06,698 as against Rs. 2,10,731 in the previous year. The small decrease was due to fall in prices of the agricultural produce and also due to no realisations on account of profit resulting in the transactions financed from the Director's Personal Ledger Account.

Besides the above, the following grants were placed at the disposal of this Department by the (1) Imperial Council of Agricultural Research, (2) Indian Central Cotton Committee, (3) Sir Sassoon David Trust Fund and (4) Village Improvement Scheme financed from the Imperial allotments.

(1) *Imperial Council of Agricultural Research.*

Name of the Scheme.	Modified Grant, 1935–36.	Expenditure, 1935–36.
	Rs.	Rs.
1. Sugarcane Research Scheme—		
A—Agriculture	81,825	80,747
Deduct Government Contribution ..	—23,300	—22,245
Net Grant from the Imperial Council of Agricultural Research.	58,525	58,502
2. Dry Farming Research Scheme—		
A—Agriculture	43,609	43,257
Add D Works	1,600	1,600
Total ..	45,209	44,857
Deduct Government Contribution ..	—13,700	—13,566
Net Grant from the Imperial Council of Agricultural Research.	31,509	31,291
3. Cold Storage Research Scheme	18,256	16,903
4. Economic Enquiry Scheme	19,786	19,646
5. Investigation into the Virus Diseases of Plants.	88	88
6. Scheme for Improvement of Marketing in India.	23,206	23,006
Deduct Government Contribution ..	—3,206	—3,206
Net Grant from the Imperial Council of Agricultural Research.	20,000	19,800
Grand Total ..	1,48,164	1,46,230

(2) *Indian Central Cotton Committee.*

Serial No.	Name of the Scheme.	Grant received.	Expenditure.
		Rs.	Rs.
1	Broach Cotton Breeding Scheme	10,042	11,318
2	Jalgaon Cotton Breeding Scheme	8,614	10,227
3	Hubli Seed Distribution Scheme	8,927	8,610
4	Gadag Seed Distribution Scheme	7,273	6,697
5	Gadag Supplementary Scheme	626	457
6	Athni Seed Distribution Scheme	6,903	6,179
7	Surat Seed Distribution Scheme	10,701	10,414
8	Khandesh Seed Distribution Scheme	45,685	35,855
9	Clerks for Bombay Scheme	2,809	2,690
10	Banilla Cotton Seed Scheme on the Deccan Canals..	4,610	4,560
11	Survey of Goghari Cotton	656	636
12	Plant Puller Propaganda Scheme	4,450	3,564
13	Technological Assistant for Gujarat	3,702	3,377
14	Cotton Forecast Improvement Scheme ..	4,932	5,227
15	Defibration of Cotton Seed	1,436	681
16	Training Grant to Mr. G. B. Patel	5,150	3,147
17	B.D. 8 Cotton Seed Distribution and Extension Scheme.	765	674
	Total ..	1,27,281	1,14,313

(3) *Sir Sassoon David Trust Fund.*

	Rs.
1. Grant for the Investigation in connection with the Improvement of grazing lands	681
2. Grant for the Fertilizer Research Scheme	326
3. Grant for the Research Work on the Wilt Disease of Sann Hemp ..	2,677
4. Grant for the Vegetable Research Scheme	3,958
5. Grant for the Nitrogen Recuperation of Soils Scheme	857
6. Grant for the Linseed Research Scheme	2,894
7. Grant-in-aid to the Vernacular Agricultural School, Dhulia	500
Total ..	11,893

(4) *Imperial Allotments.*

	Scheme.	Grant.	Expenditure.
		Rs.	Rs.
I.	Scheme for the Improvement of buffalo and its milk supply.	5,026	4,281
II.	Scheme for the Improvement of Poultry in Villages.	1,726	1,421
III.	Scheme for the Encouragement of Pedigree Poultry Keeping in villages by granting premia to Poultry Farmer, etc.	600	....
IV.	Scheme for co-operative Egg-collection, grading and marketing.	601	335
	Total ..	7,953	6,037

As regards the Personal Ledger Account which is used for financing the distribution of improved seed and implements, the total amount advanced was Rs. 1,26,030 and the recoveries effected amounted to Rs. 1,19,477.

B. S. PATEL,
Acting Director of Agriculture.

Poona, 28th September 1936.

APPENDIX A.

LIST OF TALUKA DEVELOPMENT ASSOCIATIONS ORGANISED UP TO DATE.

According to the scheme laid down in Government Resolution No. 3378, dated 5th June 1922, Revenue Department, the number of Taluka Development Associations was 96 at the close of the year 1935–36 distributed over the Divisions of the Bombay Presidency as shown below :—

Division.	District.	Number.
Gujarat	Surat	3
	Ahmedabad	1
	Kaira	2
North Central	East Khandesh	12
	West Khandesh	8
	Nasik	5
	Thana	3
	Kolaba	2
South Central	Poona	9
	Sholapur	7
	Satara	12
	Ahmednagar	9
	Ratnagiri	8
Southern or Karnatak	Belgaum	4
	Bijapur	2
	Dharwar	7
	North Kanara	2
	Total ..	96

Subsidies amounting to Rs. 43,492 were granted during the year under report (1935-36) as against Rs. 46,294 granted in the previous year.

The Associations have been classed by the Divisional Boards of Agriculture in order of merit as under :—

Class " A "—The most successful or efficient.

Class " B "—Struggling Associations which deserve help if possible.

Class " C "—Moribund Associations.

Accordingly the number of Associations in each class is as under :—

Division.	Class. A.	Class. B.	Class. C.	Not registered.
Gujarat ..	5	..	..	1
North Central ..	11	15	4	..
*South Central ..	6	12	..	..
Southern ..	8	5	2	..

* 27 Associations in the South Central Division being newly formed have not yet been classified.

APPENDIX B.

SUMMARY OF WORK DONE AT THE POONA COLLEGE OF AGRICULTURE FOR THE YEAR 1935-36.

This is the twenty-eighth year of the College.

Staff.

The total strength of the staff was one more than the previous year owing to the addition of a temporary demonstrator for the subjects of Agricultural Engineering and Physics and Chemistry.

I was on leave till 6th December 1935 and in my absence Dr. G. S. Cheema acted in my place.

Mr. R. Y. Hulkoti, Cotton Superintendent, Dharwar, was appointed to act as Professor of Agriculture in place of Professor V. G. Gokhale on leave till 6th December 1935.

Rao Bahadur D. L. Sahasrabuddhe, Professor of Agricultural Chemistry was on leave up to 15th December 1935 when Professor N. Narayana acted for him.

Professor K. S. Kulkarny who was transferred as Cotton Superintendent, Dharwar, was retransferred to the post of the Assistant Professor of Agriculture on 8th March 1936.

Mr. A. R. Neginhal acted as Assistant Professor of Agriculture till 6th December 1935 and Mr. R. Y. Hulkoti from 6th December 1935 to 2nd March 1936.

Dr. V. N. Gokhale acted as Assistant Professor of Chemistry vice Professor N. Narayana from 15th June 1935 to 15th December 1935, and from 14th April 1936 to 31st May 1936.

Professor J. P. Trivedi, Professor of Agricultural Engineering, Physics and Mathematics was on leave from 9th March 1936 for two and half months during which Mr. A. A. Vasavada acted in his place.

Professor L. S. S. Kumar, Professor of Botany was on leave from 16th September 1935 to 10th January 1936 and Professor V. M. Chavan acted in his place.

Mr. S. R. Godbole acted as Assistant Professor of Botany vice Professor V. M. Chavan.

There have been a few changes in the personnel of the subordinate staff of Lecturers and Demonstrators, the agricultural section being affected the most by them.

Equipment.

The Botanical Laboratory was modified and fitted up to meet the needs of the new course as regards cytology and physiology and an additional Botanical Laboratory has been improvised in a part of the herbarium. It was not possible to increase the Library grant so as to make it up-to-date in literature, beyond continuing the periodical journals

and magazines and the addition of only 96 new books. Government have however sanctioned administratively an additional sum of Rs. 5,000 for five years commencing from 1937–38 for this purpose. The total number of books in the Library apart from periodicals is thus 7,619.

A five year plan costing over Rs. 31,000 for further fitting the laboratories for the revised curricula and for increasing the efficiency of the whole teaching was submitted to Government but only the first part costing Rs. 16,873 has been accorded administrative sanction to commence from the year 1937–38.

Curricula.

The new curricula which were introduced during 1933–34 in the first year ran through the complete Second Year in Science (Agri.) stage and reached the final year state in the session which commenced during the last month of the year under report.

The old B.Ag. course was taught to the final year students for the last time.

Studentship.

The number of students that attended during the year was as follows :—

Class.	First term.	Second term.
First Year in Science (Agri.)	80	77
Second year in Science (Agri.)	42	38
Senior B.Ag.	47	46
	169	161

Examination results.

In the final examination for the degree of Bachelor of Agriculture held in March 1936, 61 men appeared and 43 passed making up a total pass percentage of 70·4 as against 75 of last year. The following is the distribution of students according to the optional subjects :—

Serial No.	Subject.	Number appeared.	Number passed.
1	Intensive Study of crops (Sugarcane) ..	7	6
2	Advanced Plant Breeding	8	7
3	Advanced Agricultural Chemistry	7	6
4	Advanced Animal Husbandry and Dairying ..	5	4
5	Advanced Agricultural Economics	11	8
6	Advanced Horticulture	16	5
7	Advanced Plant Pathology	7	7
		61	43

In the Second Year examination in Science (Agri.), 24 students passed out of 42 giving a pass percentage of 57·1. In the Frist Year in Science (Agri.) examination, 42 students passed out of 80, giving a pass percentage of 52·5. The low percentage of passes in the two examinations are mainly due to the higher percentage of marks (viz. 40 per cent.) required for passing in all subjects according to the new courses. This shows that the new courses will turn out better calibered graduates than the old courses.

Comparison with the previous University results.—The percentage of successful candidates in the University examinations during the last triennium is as follows :—

Examination.	1934.	1935.	1936.
First Year in Science (Agri.)	75·47 (I.Ag. of Old Course).	70·5	52·5
Second Year in Science (Agri.)	No University Examinations.		57·1
B.Ag.	83·68	75	70·4

It is not proper to compare 1936 with the previous years in the case of the first and second year results as the two sets are based on two different standards for passing.

Special Courses.

Special courses were offered as follows :—

	Number of students.	Periods.
(1) Crop production ..	3	1—2 months. 1—1 year. 1—5 months.
(2) Dairying	5	Varying from 1 to 3 months.
(3) Entomology ..	1	1½ month.
(4) Horticulture ..	3	9 months each.
(5) Plant Pathology ..	1	9 months.
(6) Veterinary ..	2	1—2 months 1—5 months.

Post-graduate teaching.

The position in this regard is explained in the following table :—

Name of section.	For what degree.	Of what stage.			Total.
		1st year.	2nd year.	3rd year.	
Chemistry ..	M.Sc. ..	2	1	..	3
Economics ..	M.Ag. ..	..	..	1	1
	Total ..	2	1	1	4

Careers of Graduates.

The Poona Agricultural Graduates' Employment Bureau with the Principal of the College as ex-officio President has been functioning since May 1934. This helps to bring the graduates in touch with the Employing agencies. 12 graduates have registered themselves during the year, the total number thus reaching 85. 20 enquiries were received from the employing agencies and were circulated to the members. From the small number of registrations during the year and small response received to the enquiries circulated it appears that a large number of members of the Bureau have found employments.

The results of a survey of the employment of graduates of the last 5 years is given below :—

I.	*Occupations connected with Agriculture—*	
	(1) Service in Bombay Agricultural Department..	38
	(2) Service in Government Agricultural Departments other than Bombay	9
	(3) Service in Sind Agricultural Department ..	25
	(4) Native States Agricultural Departments ..	33
	(5) Sugar Factories	50
	(6) Other private concerns connected with Agriculture	15
	(7) Private farming	4
	(8) Higher Studies	11
II.	*Occupations not connected with Agriculture—*	
	(1) Service in Government Departments other than Agriculture	11
	(2) State Service	5
	(3) Educational Service	8
	(4) Other Private concerns	8
III.	*Unemployed*	10
IV.	*Not known till the end of November 1936* ..	52
V.	*Died*	2
	Total ..	281

Admissions for 1936-37.

In all, 118 from the Bombay Presidency and 20 outside Bombay Presidency, duly qualified candidates applied for admission to the first year class. Of these, 93 and 11 were respectively given admission. 87 attended actually for some or all days till the end of June, i.e. 20 days after the commencement of the new session, when only 73 from the Bombay Presidency and 5 from outside remained permanently as against a total of 85 in the last year. Amongst the new entrants there is a Jew lady student.

The educational standard of the new applicants from the Presidency is higher than in last year, about 33 per cent. as against 22 per cent. of last year having scored above 40 per cent. in their First Year in Arts Examination. All those who have come from Universities other than Bombay have to pass Intermediate Examination in Arts or Science.

The uniform dress of *khaki* short and shirt for students is general this year.

Admissions for Post Graduate Work.

Four have been registered during the first month of the new session falling in the year under report.

Scholarships.

The number of scholarships tenable for 3 years continues to be the same, as in the previous year.

The Students' Hostel.

The total number of students accommodated in the Hostel is 131 whereas there is accommodation for 132 students. The scheme for electrification of the Hostel is before Government.

Students' Cooperative Stores.

The last year's sales amounted to about Rs. 8,560 as against Rs. 7,915 of the previous year.

The total sales of Rs. 8,560 were distributed as follows :—

	Rs.
Food provisions	5,429
Stationery and other requirements	1,300
Other articles (Coal, Kerosene, etc.)	1,831
	8,560

Goods worth 70 per cent. of the total value were supplied to members and the remaining to non-members.

All the articles were sold at the same rates as the Poona market. After taking out a reserve fund of Rs. 132 and Poor Boys' fund of Rs. 214, a dividend of 6¼ per cent. and a rebate of about 6 per cent. could be distributed to the members.

Athletics and Social Activities.

The College Gymkhana continued to be active as in the past under the Chairmanship of Professor L. S. S. Kumar. During the year there was a greater attraction for tennis with the result that the third court for students had to be put in working operation.

The College contributed one U.T.C. platoon consisting of 39 men under 2nd Lieutenant V. M. Chavan, a member of the Staff. The platoon attained a very high standard of efficiency and its performance at Camp was satisfactory. The platoon won the hockey shield and one of its members secured the second prize in shooting.

The Agricultural College Rover Crew was in charge of Professor J. P. Trivedi, also a senior member of the Staff who is the Assistant Provincial Scout Commissioner, C. D. They had a good programme last year.

The Annual Social Gathering of the past and present students and Staff was held under the presidentship of the Chief Guest the Honourable Khan Bahadur D. B. Cooper, Finance and Revenue Member of the Government of Bombay.

Students' Literary Activities.

The Poona Agricultural College Magazine.—This was continued as in the past under the management of students ably assisted by the Staff Editor, Professor A. K. B. Cazi.

The Agricultural Association and Debating Society had a fairly good programme of meetings.

Students' Guardianships.

This continued to be useful. Both students and Staff took interest in its working. The tutors report appreciation of students for the system.

Aid and Assistance to the Public.

Veterinary Hospital.—Apart from the main purpose of practical instructions to the students of the College, it has continued to help the public as in the past.

The number of in and out-patients during the year was 516 and 4,696 respectively.

Research and Advice.

The function of this institution is no less of research and advice than of teaching. In fact, about 60 per cent. of the total budgets of the sections at the College is spent on research and advice.

All the Staff of the College have carried on research and advisory work in the time available after satisfying the needs of teaching and administration of their respective sections. Summaries of such research and advisory work are embodied in the reports of the respective heads of sections which are appended to the Annual Report of the Department.

Visitors.

Amongst the many visitors including students' parties, the following may be prominently mentioned :—

Members of the German Scientific Hindukush Expedition.

His Highness the Maharajasaheb of Shahpura.

Mr. Lala Anand Sarup, M.L.C., Muzaffarnagar.

Dr. Walter N. Koelz, Representative of Bureau of Plant Industry, United States, Department of Agriculture.

Mr. Peroy Kent Norris, Agricultural Commissioner, United States of America.

Programme of Work for the year 1936–37.

ADMINISTRATION AND CONTROL OVER THE TEACHING ACTIVITIES AND WELFARE OF THE STUDENTS OF THE COLLEGE.

V. G. GOKHALE,
Principal,
College of Agriculture, Poona.

COLLEGE OF AGRICULTURE,
POONA :
July 28th, 1936.

APPENDIX C.

Summary of Work done under the Deputy Director of Agriculture, North Central Division, for the year 1935–1936.

I. AGRICULTURAL CONDITIONS.

In the districts of Thana and Kolaba, rains were adequate and favourable till the middle of September. This was followed by a long dry period up to the middle of October when heavy rains were again received. This long drought lowered the yield of rice from 20 to 40 per cent. according to locality. The crops yielded better in Kolaba than in Thana, but the quality of grain was spoilt by the late rains.

In Nasik, the distribution of rainfall was fairly good and favourable for the crops but not adequate enough to replenish the under-ground currents of irrigation wells. This inadequacy is being experienced continuously for the last three years and there has been a general deficiency of water in wells and tanks.

Rabi crops of wheat, jowar and linseed progressed well for some time. Jowar, however, suffered later for want of moisture and wheat was affected by rust. The yields of these crops were 20 and 30 per cent. below normal respectively. No damage was however caused by the occurrence of frost as in the preceding two years.

In Khandesh, the rains were favourable for sowing and for early growth of crops in June and July. This was followed by a long break throughout August. The rains received in the first week of September improved the situation and the yields of kharif crops were normal. The season was also favourable for the rabi crops.

In East Khandesh the attack of wilt on cotton was more marked in the talukas of Jalgaon, Bhusaval and Raver. In West Khandesh damage by grass-hoppers was caused to the cotton crop to varying extent in parts of Shahada, Shirpur and Sindhakheda talukas.

The market for cotton was on the whole on the same high level as in the previous year but the prices declined in the latter part of the season. Prices for groundnut, jowar, wheat, bajri and rice were steady and more or less on the same level as in the preceding year.

II. RESEARCH AND EXPERIMENT.

COTTON.

(1) *Plant-breeding Work.*—The three promising strains of Neglectum Verum, viz. N.V. 57-7, N.V. 56-3 and N.V. 56-17, referred to on page 47 of the last year's report, were again compared for yield in replicated plots on the Jalgaon farm during the year under report. On Dhulia and Bhadgaon farms the verum strains N.V. 57-7 and N.V. 56-3 were similarly

tried, the variety N. V. 56–17 being omitted for want of sufficient seed. The variety N. V. 57–7 gave significantly higher yield than N. R. and Banilla on the Jalgaon farm only but its yield results have not been encouraging on Bhadgaon and Dhulia farms. The crop having suffered early from drought that prevailed at these two places in the month of August. N. V. 56–3, however, has done well in most of the trials and has given significantly higher yield than Banilla at Bhadgaon and Dhulia farms. This crop has not, so far been found susceptible to adverse climatic conditions.

The mean fibre length of the three strains measured 0·90, 0·92 and 0·90 inches as against 0·72 inch of Banilla. There has been an improvement in the spinning performance of these varieties over last year's results, the highest standarad warp counts for the year being 41's, 38's, and 35's respectively as against 13's counts of Banilla. This certainly represents a notable advance over Banilla in respect of both fibre properties and spinning performance.

As regards the wilt resistance of these varieties this year's results are confirmatory with those of the previous years, the percentage of deaths due to wilt being only 4·1, 1·5 and 6·0 respectively. The average ginning percentage in the case of these varieties has been 32·5, 34·5 and 33·0.

In the coming season, village trials of N. V. 57–7 and N. V. 56–3 in comparison with the local variety will be conducted at fourteen centres. The results are awaited with interest.

(2) *Manurial experiments—*

(1) *Application of farm yard manure.*—Manurial experiments with farm yard manure on cotton were repeated in two series for the third year on the Jalgaon farm with 15, 10 and 7½ cartloads per acre in replicated plots. In the first series cotton followed jowar while in the second series the preceding crop was groundnut. The results of three years bring out that cotton after groundnut respond better to farm yard manure than cotton after jowar. Again even with groundnut as the preceding crop, the quantitative effect of the farm yard manure was not the same each year. In the first year, the increase in yield with 15 cartloads of the manure was significant. In the second year all the three quantities brought about significantly higher yields while in the third year, the application of 10 cartloads only was significantly effective. In no case, however, the increase has been enough to meet the cost of the manure.

(2) *Replacement of farm yard manure by oil cake applied either singly or in conjunction with sulphate of ammonia.*—This experiment was carried out on cotton with 400 lbs. of castor-cake, 234 lbs. of groundnut cake, 117 lbs. of groundnut cake *plus* 43¾ lbs. of sulphate of ammonia in comparison with 15 cart-loads of farm yard manure. None of these treatments however gave significantly higher yields. This experiment has been in progress for the last three years but the result have been vitiated every year by the appearance of wilt disease to varying extent in differen plots. No conclusion can therefore be drawn from these experiments.

General observations during the whole period of the experiment however indicate that the mixture of groundnut cake and sulphate of ammonia is the best of all.

JOWAR.

(1) *Selections.*—The selection work in Aispuri variety of jowar was continued on Jalgaon farm. The four promising strains referred to on page 49 of the printed report of last year, viz. strain Nos. 17, 41, 44 and Salsingi, were further studied for various morphological characters. Strain No. 44 and Salsingi possess comparatively short, compact and well filled ear-heads. Selection No. 41 has a tapering and densely packed ear-head while that of No. 17 is loose and elongated. Salsingi is found to be earlier than No. 44 by about a week. All these strains have maintained their purity and selfed seed has been collected for the rigid yield tests during the coming season.

WHEAT.

(1) *Manuring.*—Manuring of wheat with sulphate of ammonia applied at the rate of 20 lbs. per acre at the time of sowing was compared with no-manuring in five replications on Jalaon farm. Results show that this fertiliser is significantly effective, the yield having increased by 17 per cent. This is the third year of the experiment. Out of the three years, in two, the increase in yield was enough to pay the cost of the fertiliser and leave profits to the extent of Rs. 3 to Rs. 4. The experiment will be repeated.

(2) *Effect of passing a roller on young wheat crop.*—This experiment is intended to see whether rolling of wheat two weeks and three weeks after sowing has any beneficial effect on tillering and consequently on the outturn. This is being tried for the third year on the Jalgaon farm. The results of all the years are confirmatory in showing that this treatment does not lead to increase in yield. The experiment will be discontinued.

RICE.

The three years' results of the experiments on manuring rice with sulphate of ammonia carried out at the Rice Research Station, Karjat, have been summarised on page 51 of last year's report. They are corroborative of the finding, that 40 lbs. N. per acre as sulphate of ammonia is the most profitable dose for rice in tracts represented by Karjat. This fertiliser has however been shown to have a depleting effect on the lime and the organic contents of the soil as also on the proteid contents of the grain (page 50 of the Annual Report, 1933–34) and for this reason it is not being recommended as a manure for rice. Nitrogenous manurial experiments have, therefore, been started from the current year with castor and safflower cakes in one guntha plots in five replications. The quantities used were 40 and 60 lbs. N. per acre. These oil-cakes were also tried in combination with a small quantity of

sulphate of ammonia (10 lbs. N. per acre). The following are the results :—

(1) All manured plots gave significantly superior yields over no manure plots.

(2) In the case of castor cake, increased returns were obtained with increased quantitites of the manure, they were 52 and 72 per cent. higher with 40 and 60 lbs. applications respectively.

(3) In the case of safflower cake, although increased yields were obtained with 40 and 60 lbs. N., the difference between the effect of the two quantities was not significant.

(4) Addition of sulphate of ammonia (10 lbs. N. per acre) to any of the two oil cakes (50 lbs. N. per acre) did not improve the yield over oil-cakes alone.

(5) Considering the price factor castor cake was found to be more profitable than safflower cake. With 60 lbs. N. the net profit with the two oil cakes was Rs. 62 and Rs. 30 per acre respectively.

This is the first year of the experiment and it will be repeated for two years more. The other research work on rice has been discontinued from the current year.

At the suggestion of the Imperial Council of Agricultural Research Professor Dastur's conclusion, that a mixture of sulphate of ammonia and nitrate of soda is more effective than sulphate of ammonia alone, was put to test at Karjat in plots measuring 1/100th of an acre in six replications. The results did not confirm the conclusion.

FROST PROTECTION EXPERIMENTS:

The frequent occurrence of frost and subsequent damage to the valuable crop of grape in Nasik District during the last ten years has evoked demands for protection methods. The only logical means of protection is to create conditions to keep up the air temperature of the orchard above freezing point. An experiment with this end in view was tried in the cold season at Nasik in the grape garden of Mr. Krishnarao Phadtare.

Heating the garden with Harrison type of crude oil heaters and buring of wood fires in various numbers per acre with and without wind-breaks were tried. Of all the treatments the one with wind-breaks combined with 400 equi-distant wood-fires per acre, kept burning from 2 a.m. to 7 a.m. was efficient enough to raise the air temperature from 7° to 8° F above the control. It is generally experienced that fall in temperature during frost is of 5° to 10° F. below the freezing point. The quantity of firewood required was from 5,000 to 6,000 lbs. per acre per night with 3 lbs. of crude oil to start the fires and 12 men to attend to them. The plot of grape garden protected with wind breaks was 33 gunthas and the cost of erecting wind-breaks on all the four sides

was Rs. 66. It may be noted that larger the area of garden the expenditure will proportionately be less. The material used for the construction of wind breaks comprises bamboos for the frame work and *bajri* straw for the actual wind-breaks. The *bajri* straw is generally available with each orchard-owner from his farm land and it can be re-used as fodder to cattle after the cold season is over. Similarly, also the fire-wood and cowdung cakes can be stored and used for domestic purposes if frost does not occur.

As frost did not occur during the year under report, the experiment will have to be repeated under frost conditions for confirmation.

III. AGRICULTURAL SERVICE AND PROPAGANDA.

COTTON.

(1) Extension of Banilla cotton—

The distribution of seed of Banilla cotton has been in progress for the last five years in the wilt-free tract of Khandesh. The following table shows the quantity of seed produced in different stages :—

Table showing Banilla cotton seed produced during 1935-36.

Stage.	Place.	Area in acres.	Seed produced and stocked in lbs.	Remarks.
1	2	3	4	5
I	Dhulia School and Bhadgaon Farm.	10	800	Selfed seed.
II	Bhadgaon Farm ..	106	15,730	Produce of selfed seed.
III	Bharvas and Kolpimpri groups.	2,208	218,530	Produce from seed supplied from Bhadgaon farm.
IV	Registered seed-growers*	17,580	589,705	Produce from seed supplied from stage III.
V	General distribution ..	..	....	The seed from stage IV will be used.
	Total ..	19,904	824,765	

*The registered seed growers were in the talukas of Amalner, Erandol, Shirpur, Pachora, Chalisgaon and Malegaon.

This seed would suffice for about 32,990 acres at the rate of 25 lbs. per acre.

The total quantity of seed distributed for sowing in the season of 1935 was 799,350 lbs. in the inner and outer reserved areas. This occupied 19,788 acres. Seed distributed for general cultivation amounted to 804,917 lbs. sufficient for 32,200 acres. In addition, some seed spreads through merchants, land-owners and cultivators. It is estimated that

as a result of the operations the Banilla cotton in Khandesh has spread to 130,000 acres.

The experience of five years has indicated that Banilla gives more outturn and is better in staple in black soils than in lighter ones. The tapti belt is a more favourable tract. From next year the venue of work will be shifted to the talukas in the above belt viz. Amalner, Erandol, Chopda, Sindakheda, Shirpur, Shahada and Nandurbar.

Banilla seed is also distributed in the wilt-affected area of East Khandesh in Jalgaon and Bhusaval talukas by the Taluka Development Associations there. 2,500 lbs. seed for this purpose was grown on the Jalgaon farm and further multiplied on private seed farms at Salsingi in Bhusaval Taluka and Mhasvad in Jalgaon Taluka. The total quantity of seed for general cultivation in this area was 31,360 lbs.

II. 1027 *A.L.F. cotton.*

Although most of West Khandesh grows short-staple cotton, the western most parts of the district are suitable for growing long staple Broach cotton. In this tract a beginning to distribute pure seed of 1027 A.L.F. cotton was made during the year and as much as 27,716 lbs. of seed to suffice for 962 acres was distributed, the bulk of it being in Navapur Taluka.

III. *Regulated Cotton Markets.*

(*a*) *Dhulia Market.*—Dhulia market completed its sixth season of working. It continues to work efficiently and enjoys the confidence of both the cultivator and the buyer. The total number of carts arrived this year was 56,087 of seed cotton, 1,554 of lint and 424 of waste cotton up to the end of May 1936. These arrivals have surpassed those of any of the preceding years.

The increase in arrivals in 1935-36 is partly the index of the rising reputation of the market. The most disquieting feature of the arrivals, however, is the enormous rise in the number of carts of waste cotton which is alleged to have been brought from Amalner, Jalgaon, Chopda Taluka and other cotton centres where there are gins and presses for the purpose of mixing with good cotton. The tendency for this malpractice has been growing in the Dhulia market since last year and the cotton market committee has been moving to find out means of control.

The number of disputes settled this year was 640 of which only 24 appealed to the Dispute Committee. Last year the total number of disputes was 431. The increase during the current year was partly due to greater arrivals and partly to the spoilt cotton by late rains.

The financial position of the market continued to be sound. The receipts during the year amounted to Rs. 11,254 and the expenditure was only Rs. 5,019. The Market Committee has at present a sum of Rs. 16,305 in cash as net balance in addition to the immoveable property worth Rs. 5,500. The market site is being acquired towards which the balance is proposed to be utilised.

(*b*) *Amalner Market.*—Reference has already been made on page 52 of the last year's report to the regulated cotton market started at Amalner.

This is the second year of that market. The total arrivals were 21,482 cart-loads of seed cotton, lint and cotton waste. The receipts amounted to Rs. 3,831–12–0 as against the expenditure of Rs. 2,560–11–3. The market is getting popular. Mr. S. V. Shevade, Cotton Superintendent, was re-elected as the Chairman of the Market Committee.

OTHER IMPROVED SEEDS.

(1) *Seed Multiplication.*—The organisation for the multiplication and distribution of pure seeds of improved varieties of crops such as, wheat, bajri, jowar and rice described on page 53 of last year's report continued to work. The following table shows the quantities of pure seeds produced on Government farms as the 1st stage.

These quantities were distributed to the owners of the private seed farms only for stage II of the organisation.

Table showing the quantities of pure seeds of improved varieties of crops distributed from the Government farms.

Seed.	Seed distributed in lbs. from Government farms.					Remarks.
	Jalgaon.	Bhadgaon.	Dhulia.	Niphad.	Karjat.	
1	2	3	4	5	6	7
Wheat.						
No. 224 ..	8,984	..	..	..	..	
No. 168 ..	13,800	..	..	..	..	
No. 808 ..	49	..	..	1,074	..	
Pusa No. 4 ..	..	2,100	700	..	..	
Banilla cotton ..	1,210	27,552	600	..	..	
Groundnut ..	37,260	43,800	6,700	..	..	
Rice.						
K. 42 ..	..	..	..	..	15,147	
K. 226 ..	..	..	..	..	1,071	
K. 540 ..	..	..	..	..	833	
K. 184 ..	..	..	..	..	35	
K. 412 ..	..	..	..	..	602	

The seeds shown in the foregoing table were multiplied on private seed farms as per the following statement.

Statement showing the details of private seed-farms.

Village.	Taluka.	Name of the owner.	Area of the farm in acres.	Names of the seeds to be multiplied.	Quantity of seed grown and stocked for distribution in 1936-37 in lbs.
1	2	3	4	5	6
	East Khandesh.		Acre.		
Salsingi ...	Bhusaval ...	R. S. Maruti Somaji Patil.	151	Banilla Cotton ...	11,200
				Groundnut ..	12,000
				Wheat No. 224 ..	450
				Akola Bajri ...	4,000
Varangaon ..	Do. ...	Mr. Tukaram Hari Chaudhari.	16	Wheat No. 224 ...	5,760
Phupnagari ...	Jalgaon ...	Mr. Dodhu Ramchandra Patil.	98	Wheat No. 224 ..	16,080
				Banilla Cotton ..	10,640
Khardi ...	Chalisgaon ..	Dr. R. B. Kasurkar.	50	Akola Bajri ..	211,000
Utran ...	Erandol ..	Shet Manakchand Kisandas.	80	Groundnut ..	28,000
				Wheat No. 224 ..	20,000
Mhasavad ..	Jalgaon ..	Mr. Hiraman Shama	20	Do. ...	10,000
Bhadgaon ..	Bhadgaon Peta ..	Mr. Purnapatre ...	25	Wheat No. 224 ..	9,300
Amalner ..	Amalner ...	Mr. Trimbak Gopal Muthe.	35	Wheat No. 224 ...	17,500
	West Khandesh.				
Sakree ...	Sakree ...	Mr. M. G. Bhosle ...	20	Pusa No. 4. ...	8,640
Shingpur ..	Taloda ...	Sardar Virsing B. Padvi.	40	Wheat No. 168 ...	12,500
Patilvadi ..	Shahada ...	Dr V. H. Patil ...	35	Do. ...	17,500
Vaghadi ...	Shirpur ...	Mr. Vedulal Gokuldas	25	Do. ...	8,640
Shindakhed ...	Shindakheda ...	Mr. Dagaji Lahu ...	25	Do. ...	7,920
Khadnagaon ...	Nandurbar ...	Mr. Sadashiv Makan	25	Do. ...	...
	Nasik.		A. g.		
Vinchur ...	Niphad ...	Sardar N. G. Vinchurkar.	22 20	Wheat No. 808 ...	4,000†

*Crop failed for want of sufficient sub-soil moisture.

†Grain not good for sowing.

Statement showing the details of private seed-farms—contd.

Village.	Taluka.	Name of the owner.	Area of the farm in acres.	Names of the seeds to be multiplied.	Quantity of seed grown and stocked for distribution in 1936-37 in lbs.
1	2	3	4	5	6
			A. g.		
	Nasik—contd.				
Chinchola ..	Nasik ..	Nasik Panjrapol ..	12 0	Wheat No. 808 ..	2,160*
Babhulgaon ..	Yeola ..	Yeola Goshala ..	163 3	Do. ..	4,416*
				Maldandi Jowar ..	3,600*
				Dagdi Jowar ..	960*
				Akola Bajri ..	12,000
Vadner ..	Malegaon ..	Mr. Narayansing Raoji.	293 30	Banilla Cotton ..	56,040
				Akola Bajri ..	10,800
				Wheat Pusa No. 4..	16,800
	Kolaba.				
Asare ..	Karjat ..	Mr. S. R. Kaprekar.	5 0	Rice Kolamba No. 42.	7,000
	Thana.				
Bandhan ..	Palghar ..	Mr. Deoji Hari Patil.	22 0	Rice Kolamba No. 226.	7,300
Masvan ..	Do. ..	Mr. Nathu Patil ..	2 0	Rice Kolamba No. 540.	1,200
Dehari ..	Umbergaon ..	Mr. Deharivala ..	1 0	Rice Kolamba No. 184.	300
Nagankas ..	Dahanu ..	Mr. M. L. Raut ..	1 0	Do. ..	300
Dorli ..	.. ..	Mr. Ganpatjan Patil..	6 0	Rice Kolamba No. 42.	10,000
Vasar ..	.. ..	Mr. D. K. Phadke ..	6 0	Do. ..	
Bhivandi ..	Bhivandi ..	Mr. G. M. Jogiekar ..	6 0	Do. ..	

*Grain not good for sowing.

(2) *Seed distribution.*—Seed produced on private seed farms and on other reliable cultivators' fields was purchased and distributed to

registered seed-growers with the help of the Taluka Development Associations. The quantities of seed thus distributed are set out in the following table :—

Name of crop.	Name of improved variety.	District.	Quantity distributed to registered seed-growers.	Approximate area for which the seed would suffice.
1	2	3	4	5
			Lbs.	Acres.
Bajri ..	Akola ..	East Khandesh ..	57,274	14,000
		West Khandesh ..		
		Nasik ..	6,150	1,540
Jowar ..	Maldandi ..	East Khandesh ..	6,000	600
		West Khandesh ..	8,500	850
Wheat ..	No. 224 ..	East Khandesh ..	70,129	1,170
	No. 168 ..	West Khandesh ..	74,270	1,238
	Pusa No. 4 ..	East Khandesh ..	7,512	125
		West Khandesh ..	18,797	313
		Nasik ..	19,695	245
	No. 808 ..	Nasik ..	64,960	1,300
Rice ..	K. 226 ..	Thana ..	13,500	340
	K. 540 ..	Thana ..	2,627	65
	K. 184 ..	Thana ..	1,980	50
	K. 42 ..	Kolaba ..	28,565	715

Seeds produced on farms of registered seed growers were distributed by the Taluka Development Associations, merchants and landlords for general cultivation. As a result of all the seed distribution operations and natural spread the areas under the improved varieties are estimated as under :—

Statement showing the estimated area in acres under improved varieties of crops.

Wheat Nos.				Banilla cotton.	Akola bajri.	Rice.
224	168	808	Pusa No. 4.			
2,500	2,100	1,500	2,950	130,000	143,000	7,000

In Nasik, wheat No. 808 is being distributed but its spread has received a set back as the strain showed more susceptibility to damage by frost. During the year under report the attack of rust was virulent and this wheat also suffered appreciably. These weak points are likely to hinder the spread of this wheat.

The popularity of Pusa wheat as rust evading type has also been shaken as it was attacked by rust severely in Sinnar and other talukas.

In East and West Khandesh, 14,500 lbs. of Maldandi jowar seed has been distributed and the total area under this variety is estimated at 1,500 acres. The variety is found rather late by about a fortnight and attempts are in progress to get an earlier type.

Great impetus to the seed distribution work was received during the current year from the District Village Improvement Committees. In East Khandesh a sum of Rs. 2,000 was made available for the purchase and distribution of seed of wheat No. 224. The seed from this amount was distributed on the system of return of equal quantity after the harvest of the crop. The seed obtained by way of return has been stocked and will be distributed again next year on the same system. In West Khandesh the Committee allotted a sum of Rs. 990 for covering the transport charges of seed of wheat No. 168 for distribution in the season under report and also for giving subsidy at the rate of Rs. 2 for every measure of 720 lbs. of seed that may be distributed by the growers from the resulting produce in the succeeding season i.e., 1936–37. It also gave Rs. 265 for similar purpose for spread of Pusa wheat.

In Kolaba, the District Village Improvement Committee has allotted a sum of Rs. 400 for the distribution of seed of Kolamba strain No. 42 which is already under distribution. The seed is to be given out on condition of return of equal quantity in the succeeding season. As referred to on page 56 of last year's report the two strains Nos. 42 and 226 of late Kolamba rice are steadily getting into disfavour in North Thana on account of the introduction of a new variety called " Surti Zinya Kolamba " by the trade. Efforts to evolve a Zinya Kolamba type are in progress by the Crop Botanist to Government and the results are awaited. Until this is available the rice seed distribution work in North Konkan districts would not progress much, so far as the late varieties of rice are concerned.

As regards intermediate varieties of rice, the strain Kolamba No. 540 has been found to be superior in yield and in price in North Thana district and its demand is increasing. This is the second year of its introduction and the seed is being multiplied further.

IRRIGATED CROPS AND ORCHARDS.

(1) *Sugarcane.*—The variety CO. 290 which is a hardy, early and fairly frost resistant cane maturing in about 11 months and which has been found to be a suitable variety for conditions obtained in Nasik and Khandesh is being distributed. Last year 15,000 canes were distributed after the frost in the Kadva Canal tract, Chandor and Baglan talukas on condition of return of equal number after the harvest. All these canes were received back during the current year and were distributed on the same system to other cultivators. In addition to these, a sum of Rs. 500 was received from the Village Improvement Funds of Nasik District to promote this propaganda and 14,710 sugarcanes of the value of Rs. 271 were purchased and distributed.

In Sakree taluka of West Khandesh 13,800 sugarcanes of CO. 290 were purchased from the sum of Rs. 500 allotted by the District Village Improvement Committee of West Khandesh and these have been distributed for further multiplication on condition that equal number of canes will be returned for further distribution next year.

In addition to CO. 290, demand for other varieties were also met by supplying 2,975 sugarcanes of E. K. 28, 18,300 of P. O. J. 2,878 and 38,250 of H. M. 544 in Nasik District. These were supplied at cost paid by the cultivators.

(2) *Lucerne.*—This crop is gaining in popularity in Khandesh and Nasik districts as a fodder crop. As much as 1,248 lbs. of seed in East Khandesh, 4,348 lbs. in West Khandesh and 500 lbs. in Nasik districts were distributed. In addition a fairly large quantity of seed was distributed by the seed-firm at Nasik.

(3) *Vegetable crops.*—Indents for seeds of various vegetable crops such as, *Bhendi, gowar,* cabbage, knolkhol, onion, brinjals, chillies, etc., were fulfilled by the district staff as well as by the Taluka Development Associations. In West Khandesh, 245 lbs., in East Khandesh 718 lbs. and in Nasik 150 lbs. of seed were so supplied. The District Agricultural Overseer, Nasik, received indents for onion seed and grape vine cuttings and these were supplied to the extent of 407 lbs. and 3,250 cuttings respectively.

(4) *Development of Irrigation Farming in Kolaba District.*—In Kolaba, there are three Hydro-electrict Power Houses and considerable quantity of tail-water from these houses is let into the three rivers viz., (1) Patalganga, (2) Pej and Ulhas and (3) Kundalika. This perennial supply of water has been going to waste for a number of years and the Agricultural Department has been attempting to induce people to use this water. A scheme for erecting water-lifts on the Patalganga and Kundalika rivers has been sanctioned by the District Village Improvement Committee, Kolaba, ata cost of Rs. 2,500 and Rs. 2,150 respectively on the two rivers. A Lister 5 B.H.P. oil-engine and pump was erected from these funds towards the end of the year, at Kasap, on the Patalganga river and the cultivators have agreed to pay for the running cost of the engine and grow irrigated crops. A small farm has been opened by one cultivator with this pump and about 10 more have promised to join him from next season.

A Persian type of Bucket Pump (Bulsar Rahat) was also fitted up at another village, viz. Vayal on the same river and it is being worked by two cultivators. Demands for more water-lifts are being received. Plans and estimates for erecting similar water-lifts on the Kundalika river have been made and these will be fitted up after the close of the rainy season. On the Pej river, an irrigation farm has been started at Karalevadi by a cultivator who possesses a Balsar Rahat. His example is likely to be copied by others. On the Ulhas river a farm has been started near Neral.

(5) *Fruit Culture.*—As reported last year on page 57 of the printed Annual Report the area under fruit plantations is increasing in Khandesh

particularly under mosambi, santra and grafted mangoes. The district staff and the Taluka Development Associations supplied as many as 11,286 grafts and seedlings in West Khandesh and 35,559 in East Khandesh.

The Horticultural Sub-Overseer gives advice in selection of sites for orchards, cultivation, care of plants, manuring, root and shoot prunning, budding and treatment of diseases and pests like gummosis and stem-borer. This branch of advisory and practical help is in great demand and the work is getting beyond the capacity of one assistant. The Horticultural Sub-Overseer demonstrated and carried out budding of 5,275 santra and mosambi plants, 807 bor plants and grafting on 2,605 plants. He assisted in starting 161 new orchards and visited 203 orchard for advisory work. He treated 4,355 plants for stem-borer and 543 plants for gummosis.

The practical assistance in horticultual operations received a great impetus from the District Village Improvement Committees. In East Khandesh, a sum of Rs. 1,500 was voted for engaging malis for assisting orchard owners and Rs. 600 for supply of grafts of quality-mangoes for nursery work. From this amount 462 grafts of Nilam, Alphanso, Totapuri and Pairy have been purchased. In West Khandesh the District Village Improvement Committee gave Rs. 650 for distribution of quality-mango graft for similar purpose and 480 grafts have been purchased.

The Mali engaged from 13th December 1935 in East Khandesh budded 2,385 santra and mosambi plants, prunned 977 trees for bor-budding and 1,786 santra and mosambi plants. He treated 380 plants for stem-borer and 85 plants for gummosis. The assistance of the mali is much appreciated by the people.

In Nasik, the district staff and the Taluka Development Associations supplied 3,180 budded plants of mosambi and santras, 1,158 mango grafts, 230 bor-buds, 150 lemon layerings, 55 chikoo grafts and 62 other fruit grafts. The District Village Improvement Committee has given a sum of Rs. 1,800 for development of nurseries at the school of Agriculture and Rural Vocations, Nasik, and the Central Prison at Nasik Road. From this money an area of 10 acres and 4 acres at the two institutions respectively has been developed. Besides, a sum of Rs. 500 has been allotted by that body for developing mango nurseries in the compounds of Inspection Bungalows in Nasik District. This latter work, however, is not progressing satisfactorily.

The District Agricultural Overseer, Nasik, gives advice for the development of the irrigation farms and improved methods of agriculture at the Central Prison, Nasik Road.

In Thana, the district staff and the Taluka Development Associations distributed 300 budded santra and mosambi plants, 2,097 mango grafts, 117 bor-buds, 4,675 stock seedlings of mangoes, 415 lemon layerings, 70 lbs. of cashewnut seeds, 50 jack fruit plants, 350 banana suckers, 1,450 pineapple and other fruit plants. The District Village Improvement Committee, Thana, has allocated a sum of Rs. 1,750 for the development of fruit plantations of mango, cashewnut, sour lemon an other economic

fruit trees on varkas lands which abound in the district and which do not grow any valuable crops beyond grass. They afford great scope for the development in this direction.

In Kolaba, the district staff distributed 21 santra and mosambi plants, 100 bor buds, 309 mango grafts, 75 lemon layerings, 700 mango seedlings for grafts, 141 lemon layerings, 700 cashew nuts, 250 other fruit plants and 1,000 papaya seedlings. In addition to this 8 gardens were visited and advice was given on pests like stem-borer, prunning, horticultural treatment and care of gardens, etc. The District Village Improvement Committee, Kolaba has also set aside a sum of Rs. 1,750 for the development of plantations of economic trees on varkas lands and a sum of Rs. 500 for the supply of mango grafts at half price for the establishment of mango nurseries in each taluka.

PREVENTION OF SOIL-EROSION.

It is a matter of great regret that the enormous harm done to the agricultural lands in the districts of Nasik and East and West Khandesh has not been realised in its proper perspective and most of the countryside has not been protected against surface washing and soil-erosion. The post of the Bunding Officer having been retrenched, this subject of basic importance has suffered much. Schemes for conducting propaganda for the prevention of soil-erosion and for giving technical advice were presented to the District Village Improvement Committees and sums of Rs. 600 in East Khandesh, Rs. 600 in West Khandesh and Rs. 300 in Nasik were allotted by them. The operations of these schemes were commenced rather late in the season. In West Khandesh, 336 acres were got protected against erosion in Chimthana circle of Sindakheda Taluka. In East Khandesh the scheme was started in Jamner Taluka and 150 acres were covered. In Nasik the following acreages have been covered against erosion by the district staff :—

Taluka.	Acreage.
(1) Sinnar	150
(2) Yeola	350
(3) Malegaon	150
(4) Nasik and Niphad	313
(5) Other places	14.

MAINTENANCE OF SOIL FERTILITY.

(1) *Farm Yard Manure.*—The question of the supply of the basic organic manures like farm yard manure, poudrette, compost and green manure received more attention during the year. The District Village Improvement Committees have been paying special attention to proper pitting of cowdung and village refuge and in several places the Revenue Department has given additional lands for opening pits. During the last 18 months it is estimated that as many as 12,371 farm yard manure pits were prepared in the district of East Khandesh, 5,181

in West Khandesh and 2,500 in Nasik by the various Village Improvement Committees and the Taluka Development Associations.

(2) *Compost.*—The supply of organic manure can be augmented to an appreciable degree if every care is taken to collect all the farm refuge such as weeds, stubbles, leaves, litter and refuge from the threshing yard and turned into compost manure. The Indore process of compost making was tried on the Bhadgaon farm in 1934 and is now adopted on all Government farms in the division. During the year under report 100 cart-loads of compost were prepared on the Bhadgaon farm, 95 on Jalgaon farm and 55 on Dhulia Agricultral School, the cost per cart being from 5 annas 3 pies to 10 annas 6 pies.

The District Village Improvement Committee, East Khandesh has allotted a sum of Rs. 500 for popularising the methods of compost making, proper pitting of cowdung and preparation of charred bone. The compost manure will be prepared during the rainy season of 1936 on several private farms under the guidance of a man specialised in compost making and entertained from these funds. So far he carried out preliminary propaganda and got collected material for compost making.

(3) *Poudrette.*—The District Village Improvement Committees of East Khandesh and Nasik have allotted sums of Rs. 1,500 each for popularising trench latrines in villages. From this fund such latrines have been opened in 90 villages in Jamner Taluka and 10 in Niphad Taluka by the Revenue Department. Apart from improving the sanitation of villages this would result in producing fairly large quantities of poudrette manure. It is necessary to encourage this activity all over the country.

(4) *Green Manuring.*—Mention has been made on page 58 of the last year's report about the subject of green manuring to the wheat lands in Khandesh. The progress has been maintained and as many as 42,570 lbs. of sann seed was sold with the help of the Taluka Development Associations in Shahada, Nandurbar, Amalner and Yaval talukas. The District Village Improvement Committee in East Khandesh has allotted the sum of Rs. 500 for popularising the method of green manuring and the seed has been issued to about 200 persons for sowing in the kharif season of 1936. In West Khandesh the District Village Improvement Committee has also given the sum of Rs. 500 for selling the seed at concession rate of 75 per cent. of cost price and the amount has been spent accordingly.

(5) *Bone Manure.*—The process of charring bone for easy crushing, described on page 59 of last year's report was demonstrated at 22 places in Khandesh and as much as 51,000 lbs. of crushed bone was prepared and used for fruit orchards.

In Thana District, the orchard owners preferred to purchase bone meal from local factories and according to the Inspector of Agriculture, Kalyan 6 tons of bone meal was used in South Thana. 4,000 lbs. of the same in North Thana and 3,060 lbs. in Pen Taluka were also distributed by the district staff.

(6) *Oil-cakes and Fertilisers.*—The use of oil-cakes and fertilisers continues to be on increasing scale and as the firms dealing in these manures have got their agents at a number of places the Department is not now required to take much part in their distribution. Many of the Taluka Development Associations are the agents of these firms and the following table shows the quantities distributed by them :—

Table showing the distribution of fertilisers and oil-cakes.

Name of manure.	Quantity distributed in the district in lbs.		
	Khandesh.	Nasik.	Thana and Kolaba.
Sulphate of ammonia	344,542	33,286	201,852
Oil-cakes	429,204	51,272	6,748
Nicifos	....	16,800	62,810
Nitrate of Soda	....	1,777	....
Denatured salt	....	....	81,600

IMPROVED IMPLEMENTS.

In Khandesh, there are 43 implement depôts of which 40 belong to the Taluka Development Associations. These depôts keep large stock of iron ploughs for hire. The total number of such ploughs was 597 as against 444 in the preceding year. The amount of hire realised by the depôts of the Taluka Development Associations amounted to Rs. 4,153. The tree departmental depôts received Rs. 248 by way of hire charges. Private agencies have also taken up the business of stocking iron ploughs for hire and from the information collected it is seen that there are 20 depôts with 259 ploughs belonging to these agencies. The number of oil engines and pumps is rapidly increasing and there are now 125 of them in Khandesh of which 45 were fitted up during the year under report. Iron mote is also replacing the leather mote and in West Khandesh 797 iron motes and in East Khandesh 159 were purchased during the year under report.

In Nasik District, there are 15 depôts of which 10 belong to the Taluka Development Associations. The total number of ploughs on hire in latter depôts was 454 as against 290 of last year. The amount of hire realised was Rs. 3,094. The departmental receipts were Rs. 296. The amount of hire in both the cases also include the hire charges on sugarcane crushers, gul-pans, etc. In this district, also depôts belong to private agencies which have sprung up for stocking implements on hire.

In addition to the ploughs on hire, 105 iron ploughs, 612 spare parts, 18 sugarcane crushers, 20 gul-pans, 132 gul-moulds, 14 skum strainers, 6 fire grates, 96 chains, 40 iron motes, 4 sprayers, 1 dust gun and 1 Bulsar Rahat were ordered out and supplied to the cultivators by the district staff.

A notable advance was made by the Kadva Canal Irrigators' Association by purchasing a power sugarcane crusher at a cost of Rs. 2,200 for hire to its members. This enterprise of that body was subsidised with Rs. 1,000 by the District Village Improvement Committee, Nasik. The ordering out of the machinery and fitting up the same was done by the Agricultural Engineer to Government.

In South Thana, 2 Gujarat ploughs, 6 Balsar Rahats, 3 sprayers and 4 dust guns were ordered out and supplied. The Inspector of Agriculture, Kalyan, helped in the erection of 2 oil-engines and 6 Centrifugal pumps. He also distributed garden tools worth Rs. 50. In North Thana, 6 dust guns were supplied.

PESTS AND DISEASES.

(1) *Grape-vine Mildews.*—Spraying of Bordeaux Mixture and dusting sulphur to control the mildews have now been routine practices with the grape growers in Nasik District. The quantities of the ingredients for the Bordeaux Mixture purchased by them is estimated to be about 52,754 lbs. of copper sulphate, 4,928 lbs. of soft soap and 53,000 lbs. of lime. 2,355 lbs. of sulphur was used for powdery mildews. It is estimated that about 800 acres received these treatments.

(2) *Betelvine-wilt.*—The demonstrational and advisory work to popularise the method of treating betelvine gardens with Bordeaux Mixture was intensified during the year by the Special Kamgar stationed at Bassein in Thana District. He arranged demonstration plots at 9 centres and gave 27 demonstrations and 14 night lectures. He distributed 500 leaflets and gave out 3 sets of tubs for work and small quantities of copper sulphate and lime free of cost. It is estimated that out of about 500 acres under betelvine in the Bassein tract, about 100 acres were treated with Bordeaux Mixture. The District Village Improvement Committee, Thana, have allotted a sum of Rs. 750 for the purchase of 9 sets of tubs comprising 4 tubs each, water-cans and free supply of small quantities of copper sulphate and lime. Tubs have been purchased and given out on hire.

(3) *Jowar-smut.*—Propaganda for the use of sulphur against jowar-smut was continued in Khandesh and Nasik. The number of sulphur packets distributed in East and West Khandesh was 28,579 which would suffice for about 90,000 acres. Of these 20,000 packets were supplied free of cost in East Khandesh from the amount of Rs. 500 received from the District Village Improvement Committee of East Khandesh. In Malegaon sub-division of Nasik District 897 packets were sold.

(4) *Mango-hoppers.*—The propaganda for the control of mango-hoppers and blight disease of mango blossom was continued in Thana and Kolaba districts. The method of dusting sulphur as a remedy was demonstrated at 17 places in North Thana and Bombay Suburban districts and at 2 places in Pen Taluka of Kolaba District. 6,588 lbs. of sulphur was ordered out and supplied on indent. The number of mangoes treated was 2,160 in Thana and 460 in Kolaba districts.

The District Village Improvement Committee, Thana, allotted a sum of Rs. 750 for the purchase of 10 dust guns, 2 ladders and extension tubes, for giving them out for free use to cultivators. Sulphur dust worth Rs. 50 was also distributed in Thana district from these grants. With the help of these 10 dust guns supplemented by 4 departmental guns as many as 2,160 trees were dusted.

(5) *Gummosis and Stem-borer.*—Mention has already been made in the preceding pages that 628 citrus trees were treated against gummosis in Khandesh by creasote and 4,735 citrus and mango trees for stem-borer.

(6) *Other pests and diseases.*—Advice for the control of other pests and diseases was given from time to time and 212 lbs. of Fish Oil Rosin Soap to control aphies on lucerne and vegetables, 120 lbs. of tobacco and 15 lbs. of Nicotine Sulphate for leaf curl on chillies and tomatoes, 1,750 pills of arsenic acid for killing field rats, 34 lbs. of sulphur and 2 lbs. of cynogas for bug on betelvine were distributed.

(7) *Wild-pig Campaign.*—Preliminary arrangements for the starting of a gun club at Salsingi in Bhusaval taluka were completed. The club will commence its operations shortly. The District Village Improvement Committee, East Khandesh, has allotted a sum of Rs. 500 for this activity.

SHOWS, DEMONSTRATIONS AND CLASSES.

(1) *Agri-horticultural Classes.*—Four Agri-horticultural classes lasting for from 4 to 10 days each were held during the year under report. At Chahardi, in Chopda taluka the class was held in February and lasted for 10 days, the attendance was 44 a day.

At Bassein, the class was held in August 1935 and had a regular attendance of 175 for 8 days. Pen class was run for 4 days in September 1935 and 65 persons used to be present. The class at Palasdari near Karjat was held in April for 4 days and 100 representative cultivators from all the talukas of Kolaba district attended it regularly. The District Village Improvement Committee, Kolaba, had allotted a sum of Rs. 500 towards this class. Lodging and boarding arrangement for 60 cultivators attending the class was made free of cost. At all these classes, theoretical and practical instructions were given in agriculture, horticulture, diseases of cattle and plants, co-operation and various subjects pertaining to the improvement in villages. Lantern lectures were given at night every day. These classes have been very popular.

(2) *Poultry Class.*—A special class in the methods of breeding and rearing poultry was held at the Dhulia Agricultural School in October for 10 days. Twenty-five cultivators took advantage of this class.

(3) *Sugarcane Classes.*—Two Sugarcane classes were held in January and February 1936 at Chaundhana and Vadner in Baglan and Malegaon talukas respectively. Each class lasted for 6 days when lectures and demonstrations in the improved methods of sugarcane cultivation, implements and gul-making were given. The regular attendance was 40 at each place.

(4) *Other classes.*—Due to the Village Improvement activities the members of the district staff were called upon to give lectures on agricultural subjects at the various classes throughout the division. In Khandesh, 11 such classes were held.

(5) *Shows.*—Three District Shows were organised at Gangapur in Nasik, Nardhana in West Khandesh and Asoda in East Khandesh at the time of the visit of His Excellency the Governor of Bombay in the last week of August 1935. These were kept open for 3 days and were visited by about 5,000, 10,000 and 30,000 people respectively. The arrangement of stalls was so made as to make them self-explanatory and educative. At Nardhana, the show had agricultural horticultural poultry, cattle and various other sections. At Asoda, the show was on a still grander scale and comprised sections of agriculture, horticulture, poultry, cattle, forestry, veterinary, co-operation and rural vocations. Another large scale show was held at Mahalaxmi Fair in Dahanu taluka of Thana district in the month of April 1936 which was visited by 30,000 people.

(6) *Demonstrations.*—A very large number of demonstrations to demonstrate various agricultural improvements was held throughout the division. The following table shows the details of these :—

Table showing the details of demonstrations.

Kind of demonstration.	Khandesh.		Nasik District.		Thana and Kolaba.	
	No.	Approximate attendance.	No.	Approximate attendance	No.	Approximate attendance.
1	2	3	4	5	6	7
Crop ..	190	5,306	68	2,370	68	1,800
Manures ..	151	4,957	2	50	3	150
Implements ..	359	8,096	5	200	1	50
Control of pests and diseases.	394	9,259	46	1,150	40	2,000
Gul-making and sugarcane cultivation ..	17	400	4	200	..	..
Magic lantern ..	31	7,900	3	150	9	1,500
Cattle shows ..	3	1,250	..	..	..	..
Fair demonstrations ..	16	10,300	1	500	1	1,000
General demonstrations ..	25	9,600	21	1,400	20	1,450

INFORMATION SERVICE.

Members of the district staff in this division continued to contribute useful articles to the Marathi Magazine "Shetki and Shetkari" and to the Marathi daily paper "Dnyan Prakash". The total number of articles was 28.

A reference has been made on page 62 of last years report to the inducement of Taluka Development Associations to subscribe for much larger number of copies of the Marathi magazine " Shetki and Shetkari " for free distribution. The response to this appeal was very satisfactory and as many as 1,075 additional copies are now purchased and distributed. Arrangements for reading this magazine to the villagers through the leading village men and school teachers has been made. The fieldmen and Kamgars of the Taluka Development Associations as also the members of the district staff read out important articles and other agricultural literature at village chavadies during their night halts for the benefit of illiterate cultivators.

A very large number of departmental leaflets was widely distributed at the various demonstrations shows and classes mentioned in the preceding section. The District Village Improvement Committee in this division also printed various useful leaflets on agricultural subjects of immediate application and distributed their copies free. The number of such leaflets was 4 and 14,000 copies of these in aggregate were printed and distributed. A very useful pamphlet on " Dairying, Poultry and Vegetable cultivation " under the title " शेतकऱ्यांशीं हितगुज " was published by the District Village Improvement Association, East Khandesh, at the time of the Asoda Show as a mark of the distinguished visit of His Excellency the Governor of Bombay to that place and more than 10,000 copies were distributed. The District Village Improvement Committee, Nasik, also purchased and distributed 700 copies.

TALUKA DEVELOPMENT ASSOCIATIONS.

There are 20 Taluka Development Associations in Khandesh, 5 in Nasik, 3 in Thana and 2 in Kolaba districts. In addition there are 4 unregistered Agricultural Associations in Nasik district at Kalvan, Chandor, Nandgaon and Sinnar. These non-official bodies are a great asset for the promotion of improvement of agriculture. The large amount of useful work done by these bodies has been mentioned under the various sections in the preceding pages of this report and the consolidated statement showing the extent of their activities and financial position is given in Appendix I.

The Jalgaon, Jamner and Shirpur Taluka Development Associations continue to run their cattle breeding farms. The former two received from the District Village Improvement Committee, East Khandesh Rs. 1,000 each for the purchase of new herds of Nemari cows and bulls, Rs. 500 each for concentrated feeds and Rs. 500 each as subsidy for selling breeding bulls at half price. The Jalgaon Taluka Development Association added to its Gilligan Cattle Breeding Farm, sections of poultry and goats for multiplying and supply of studs in the taluka. The breed of goats purchased is Jamna Pari. The District Village Improvement Committee subsidised these activities with sums of Rs. 900 and Rs. 1,000 respectively.

The Sangavi Cattle Breeding Farm of the Shirpur Taluka Development Association has been given the help of Rs. 1,100 by the District Village Improvement Committee, West Khandesh, for purchasing Khilari cow and bulls to add to their herd. These activities of these Associations are most praise worthy and Government have decided to help them by grant of subsidy up to the maximum of Rs. 1,000 each, in proportion of one-third of the total expenditure.

The Jalgaon and Sindakheda Taluka Development Associations rendered considerable help in the organisation of the large shows held at Asoda and Nardhana respectively at the time of the visit of His Excellency the Governor of Bombay in 1935.

In addition to the routine work all the Taluka Development Associations gave considerable help for the advancement of the Village Improvement Schemes.

The Malegaon and Satana Taluka Development Associations rendered much help for organising the sugarcane classes at Vadner and Chaundhana respectively. The Dahanu Taluka Development Association took leading part in the Show at Mahalaxmi. The Chopda Association was responsible for the success of the Agri-horticultural class at Chahardi.

All the Taluka Development Associations deserve credit for the enthusiastic co-operation and practical work done by them.

DHULIA AGRICULTURAL SCHOOL.

The Agricultural School at Dhulia continued to do good work. 60 applications from students for admission into the school were received from which 17 were selected. There were 15 students in the 2nd year and 17 in the first year. In the Annual Examination all boys, except one in each class were successful.

The poultry section extended last year to accommodate 60 birds has been very useful in imparting training in this subject. This section received a sum of Rs. 50 from the Local School Committee and Rs. 750 from the District Village Improvement Committee, West Khandesh, for the construction of additional runs and houses and the purchase of an incubator. This help was received with the view of creating stock of cocks of improved breeds for distribution in the district. A section of floriculture was added to the school farm during the year. The boys have maintained a reading room and facilities for games are given on the school premises.

All the students are accommodated in the hostel and they manage their boarding arrangements in a single club. The charge for boarding came to Rs. 5-8-0 per month.

The Local Agricultural School Committee gave stipends to all students at the rate of Rs. 6 per month. The Committee's opening balance for the year was Rs. 3,568. This was supplemented by Rs. 2,215 by way of contributions from the Local Boards, Taluka Development Associations and Sir Sassoon David Trust Fund. The total expenditure

amounted to Rs. 1,989. The Committee deserves thanks for their continued interest.

The School farm grows improved varieties of crops and the produce is given out for seed purposes only. The annual demonstration was held on 30th September under the presidency of the Collector and it was attended by about 500 visitors. The reference about the poultry class for cultivators from the two Khandesh districts has already been made.

The Headmaster also arranged, with the help of students, a stall at the Nardhana District Show.

IV. RURAL UPLIFT.

During the year under report the Government of India gave substantial monetary help to all provinces for Rural Uplift Work and Bombay got its due share. These grants were distributed by the Bombay Government to different districts on population basis and were kept at the disposal of the Collectors. Immediate efforts were made to convince the Collectors and the District Village Improvement Committees that a fairly large proportion of these grants should be devoted to the betterment of economic condition of the rural population by the introduction of agricultural improvements and by providing facilities for their adoption. Schemes suitable to the conditions of the different districts in the division were drawn up and most of these were accepted and put into operation. It may be recalled that the progress achieved with the help of these grants has been described under each of the various activities in the preceding pages. The following table shows the grants and the purpose for which they were allocated.

Table showing the various agricultural schemes and the amounts allocated for their operation by the District Village Improvement Committees.

Name of the scheme.	Amounts allocated by Village Improvement Committees in the district.				
	East Khandesh.	West Khandesh.	Nasik.	Thana.	Kolaba.
1	2	3	4	5	6
Improvement of Agriculture.	Rs.	Rs.	Rs.	Rs.	Rs.
Multiplication and spread of improved wheats ..	2,000	1,255	..	..	..
Popularising green-manuring of wheat fields ..	500	500	..	..	..
Establishment of quality—mango nurseries ..	600	650	800	..	500
Improvement of wild-bor trees by budding ..	300	..	..	..	..
Improvement and extension of fruit orchards ..	1,500	..	..	1,750	1,500

Name of the scheme.	Amounts allocated by Village Improvement Committees in the district.				
	East Khandesh.	West Khandesh.	Nasik.	Thana.	Kolaba.
1	2	3	4	5	6
	Rs.	Rs.	Rs.	Rs.	Rs.
Popularising compost making and bone crushing by charring	500	..	..	..	..
Popularising poudrette making by introduction of trench latrines ..	1,250	..	..	..	..
Prevention of soil-erosion ..	600	600	300	..	..
Organisation of gun-clubs for crop protection from wild pigs and rohis ..	500	..	..	..	..
Spread of sugarcane variety CO. 290	..	500	500	..	..
Control of betelvine disease..	..	..	..	750	..
Control of mango hoppers ..	..	..	..	750	..
Development of Patalganga valley	..	..	..	..	2,500
Development of Kundalika valley	..	..	..	..	2,150
Extension of improved varieties of rice ..	..	..	..	..	400
Propaganda	200	..	..	..	1,200
School of Agriculture and Rural Vocations, Nasik.					
Model farming	..	..	2,000	..	..
Horticulture	..	..	1,500	..	..
Poultry	..	..	1,500	..	..
Dairying	..	..	1,500	..	..
Secondary Occupations ..	..	..	500	..	..
Subsidy for power cane-crusher to Kadva Canal Irrigators' Association, Ozar	..	..	1,000	..	..
Supply of sulphur packets ..	500	..	..	..	..
Total ..	8,450	3,505	9,600	3,250	8,250
Improvement of cattle.					
Supply of bulls and cows to cattle farms ..	2,000	1,100	..	..	..
Subsidy to cattle farms for feeds	1,000	..	..	..	..
Supply of stud bulls ..	500	1,200	..	600	..
Maintenance and incidental charges on stud bulls ..	500	700	..	..	..
Subsidy to cattle breeding farm in the district ..	..	..	3,000	..	..
Total ..	4,000	3,000	3,000	600	..

Name of the scheme.	Amounts allocated by Village Improvement Committees in the district.				
	East Khandesh.	West Khandesh.	Nasik.	Thana.	Kolaba.
1.	2	3	4	5	6
	Rs.	Rs.	Rs.	Rs.	Rs.
Improvement of Poultry.					
Subsidy to poultry farms ..	1,000	800	900	1,500	2,000
Total ..	1,000	800	900	1,500	2,000
Improvement of Sheep-breeding.					
Subsidy to Goat-breeding farm	1,000	..	..	..	..
Total ..	1,000	..	..	..	..
Grand Total ..	14,450	7,305	13,500	5,350	10,250
Grand Total ..	50,855				

Nasik, 23rd August 1936.

K. V. JOSHI,
Dy. Director of Agriculture,
N. C. D., Nasik.

Appendix I

Statement showing the information of the Taluka Development Associations in the North Central Division, for the year 1935-36.

Serial No.	Name of the Taluka Development Association.	Total actual receipts.	Total actual expenditure.	Government subsidy.	Main Activities.		
					Number of plots arranged.	Number of demonstrations held.	Quantity of seed sold and distributed.
1	2	3	4	5	6	7	8
	Nasik District.	Rs.	Rs.	Rs.			Lbs.
1	Nasik ..	1,127	1,032	629	15	12	25
2	Ozar-tambat ..	2,756	3,210	1,000	30	17	315
3	Yeola ..	1,884	2,274	668	25	29	25,716
4	Malegaon ..	2,253	2,750	1,188	48	39	99,653
5	Satana ..	2,538	2,798	1,188	35	13	13,357
	West Khandesh District.						
6	Dhulia ..	3,454	4,061	1,000	44	53	20,893
7	Sakri ..	917	1,734	1,000	42	54	19,738
8	Sindkheda ..	1,232	2,848	1,000	44	153	50,500
9	Shahada ..	1,133	1,369	1,000	54	38	20,014
10	Taloda ..	827	1,119	1,000	18	24	34,154
11	Nandurbar ..	1,128	1,441	984	23	27	26,701
12	Shirpur ..	1,328	2,227	737	27	71	17,376
13	Nawapur ..	728	154	50	8	7	23,411
	East Khandesh District.						
14	Jalgaon ..	4,982	6,549	1,000	105	26	125,449
15	Bhusawal ..	2,031	3,762	628	50	92	40,022
16	Raver ..	1,535	1,784	1,000	31	79	318
17	Yawal ..	1,939	2,064	383	101	25	7,230
18	Edlabad ..	827	1,389	1,000	44	19	476
19	Amalner ..	825	1,027	512	30	80	21,941
20	Chalisgaon ..	3,665	7,214	1,000	80	91	237,063
21	Chopda ..	1,783	2,407	50	35	46	7,214
22	Erandol ..	1,391	1,851	1,000	8	121	36,370
23	Pachora ..	2,824	3,336	..	68	78	51,055
24	Parola ..	1,229	1,229	50	16	25	49,138
25	Jamner ..	2,940	3,201	..	46	53	1,730
	Thana District.						
26	Dahanu ..	2,096	1,557	569	84	30	10,217
27	Palghar ..	1,111	1,072	1,132	15	11	7,184
28	Umbergaon ..	853	678	..	25	7	2,090
	Kolaba District.						
29	Roha ..	109	247	199	..	..	..
30	Mahad ..	38	..	..	..	..	..

APPENDIX I—*contd.*

Serial No.	Name of the Taluka Development Association.	Main Activities.				
		Number of plants and seedlings sold and distributed.	Quantity of manure or fertilizers sold.	Number of implements sold.	Number of implements kept for hire.	Total hire charged on implements.
1	2	9	10	11	12	13
	Nasik District.		Lbs.			Rs.
1	Nasik ..	24	160	1	18	20
2	Ozar-tambat ..	23	322,416	1	28	353
3	Yeola ..	481	72,138	19	107	357
4	Malegaon ..	25	59,903	178	201	955
5	Satana ..	387	74,862	347	100	909
	West Khandesh District.					
6	Dhulia ..	2,230	50,373	12	53	320
7	Sakri ..	132	42,136	8	30	48
8	Sindkheda ..	205	69,748	2	26	153
9	Shahada ..	284	57,012	3	12	42
10	Taloda ..	....	1,440	....	5	6
11	Nandurbar ..	41	56,883	2	17	182
12	Shirpur ..	1,075	36,007	....	45	86
13	Nawapur ..	....	....	....	....	....
	East Khandesh District.					
14	Jalgaon ..	3,504	240,801	27	40	395
15	Bhusawal ..	6,300	18,160	20	36	238
16	Raver ..	1,759	37,910	12	28	264
17	Yawal ..	510	11,017	21	36	510
18	Edlabad ..	400	2,959	2	26	134
19	Amalner ..	2,350	29,104	4	24	41
20	Chalisgaon ..	3,002	27,545	5	38	223
21	Chopda ..	3,506	18,622	10	23	252
22	Erandol ..	260	8,008	....	16	104
23	Pachora ..	594	36,980	176	32	193
24	Parola ..	1,277	53,374	....	27	170
25	Jamner ..	450	22,020	43	80	492
	Thana District.					
26	Dahanu ..	10,950	295,080	....	....	....
27	Palghar ..	500	32,160	2	....	....
28	Umbergaon ..	200	3,200	....	9	....
	Kolaba District.					
29	Roha ..	....	896	....	....	....
30	Mahad ..	....	....	....	....	....

ANNUAL PROGRAMME OF WORK, 1936-37.

North Central Division.

RESEARCH.

Jalgaon Farm—

(1) Rigid yield trials of cotton selections, N.V. 56-3, 56-17 and 57-7.

(2) Study of wilt-free cotton cultures.

(3) Spacing experiments with the new cotton selections.

(4) Trial of jowar selections for yield.

(5) Seed multiplication of wheat and cotton.

(6) Trial of new implements like improved harrow, seed-drills, winnowing fan, wheat thresher and cart wheels.

Bhadgaon Farm—

(1) Multiplication of pure seed of Banilla cotton (stages I and II) and replicated trials of the new cotton selections.

Dhulia Agricultural School Farm—

(1) Replicated trials of the new cotton selections.

Karjat Farm—

(1) Manurial trials of castor and safflower cakes for rice.

(2) Testing the results of Professor Dastur about use of mixture of sulphate of ammonia and nitrate of soda for rice.

(3) Cultivation of tobacco and plantation of economic fruit trees on Varkas lands.

(4) Multiplication of seed of improved varieties of rice.

(5) Multiplication of cocks of the improved breeds of poultry for distribution in the district.

AGRICULTURAL SERVICE AND PROPAGANDA.

(1) *Land development.*—Campaign against soil erosion by propaganda and practical technical advice in the methods of protection against soil erosion.

(2) *Maintenance of soil fertility.*—Popularisation of proper methods of preparing farm yard manure, poudrette by trench latrines, compost making from farm roughage, green manuring, use of bone meal and oil-cakes.

(3) *Extension of improved varieties of crops.*—Arranging for the multiplication and distribution of pure seeds of Banilla cotton, wheat strains, Nos. 224, 168, 808 and Pusa 4, Akola bajri, Maldandi jowar, Rice strains Nos. K. 224, K. 42, K. 184 and K. 540, Sugarcane CO. 290 and E. K. 28.

(4) *Trial of improved varieties of crops.*—Maldandi jowar strain No. 35–1, Dagdi jowar strain No. 15, Bajri strains Nos. 37, 54 and 59, Rice strain No. 540 and Surti Zinya, Wheat No. 111, Cotton N. V. strains Nos. 57–7, 56–3 and 56–17.

(5) *Trial of new crops.*—Tobacco on Varkas lands in Thana and Kolaba, Soya bean and African bajri.

(6) *Trial of implements.*—Sayan harrow, improved seed drills for cotton and wheat, winnowing fans, wheat thresher, boll bearing cart wheel and firegrate.

(7) *Extension of improved implements.*—Iron ploughs, petaries, Poona gul pans and furnaces, Fire-grates, power cane-crushers, iron motes and power pumping plants.

(8) *Control of pests and diseases.*—Organisation of gun-clubs for protection of crops from wild pigs and blue-bulls in Khandesh, propaganda for sulphur treatment of jowar seed against smut, Bordeaux Mixture against betelvine disease in Bassein, sulphur dusting against mango hoppers, cynogas treatment against betelvine bug, creosote against gummosis, destruction of stem-borers in fruit trees, and Black Leaf No. 40 against-leaf-curl on chillies.

(9) *Horticulture.*—Propaganda for planting economic fruit trees like mango, lemon, bor, cashewnut, etc., on Varkas lands in Thana and Kolaba districts. Popularising the planting of quality-mangoes and bor and arranging for the supply of reliable grafts and buds and budded plants. Encouraging the starting of fruit nurseries, advising on the laying out and treatment of fruit orchards and treatment against pests and diseases of fruit trees and holding of agri-horticultral classes.

(10) *Miscellaneous.*—Organisation of Regulated Cotton Markets at Jalgaon and Dhondaicha, popularising irrigation farming on Tail-water Valleys in Kolaba district and issue of frost warnings, etc.

(11) *Village Uplift.*—Development of the School of Agriculture and Rural Vocations at Nasik, development of fruit nurseries at the Central Prison Farm, Nasik Road, supply of improved seeds in Khandesh, technical help in horticulture, tree planting, poudrette making, terracing fields, compost making, bone crushing and manure pits. Improvement of poultry by subsidising poultry farms and supply of cocks of improved breeds. Improvement of cattle by subsidising cattle farms and supply of breeding bulls. Assistance in control of crop diseases and pests as in Bassein for betelvine wilt and mango hoppers in Thana district. Improvement of Varkas lands and development of Tail-water Valleys in Thana and Kolaba disricts.

K. V. JOSHI,
Deputy Director of Agriculture,
N. C. D., Nasik.

Nasik, 24th August 1936.

APPENDIX D.

Summary of work done under the Deputy Director of Agriculture, South Central Division, Poona, for the year 1935-36.

Staff.

Mr. V. V. Gadgil, B.Ag., continued to hold the charge of the office of the Deputy Director of Agriculture, South Central Division, Poona, throughout the year under report. So also, during the year under report, the Deputy Director of Agriculture, South Central Division, Poona, continued to be the nominee of Government to represent Agriculture on the Local Advisory Committee of the G. I. P. Railway and he was a Member of the Irrigation Conference.

Mr. S. B. Jadhav, B.Ag., continued to act as Divisional Superintendent of Agriculture, Deccan Canals, Baramati, throughout the year. Mr. N. S. Joshi when he was acting as Superintendent, Kopergaon Farm, was on leave on medical certificate for two months from the middle of June 1935 and Mr. C. Y. Kolhe, a fresh graduate, was appointed to act in his place. Mr. C. A. Borudey, B.Ag., who was in foreign service on deputation to work in the Sugar Factory at Akluj, reverted to British Service from 11th August 1935 and was posted at the Kopergaon Farm to work as Superintendent of that Farm. Mr. G. L. Patil, B.Ag., who was in foreign service at the Kolhapur State, reverted from 1st January 1936. He, however, proceeded, immediately on his reversion, on long leave for 10 months on medical certificate from 1st January 1936. Mr. H. C. Patil, the District Agricultural Overseer, Satara, proceeded on leave for four months from 26th April 1936 and in his place Mr. S. G. Futane, the District Agricultural Overseer, Pandharpur, was transferred temporarily to work as Agricultural Overseer, Satara. At Pandharpur, Mr. C. Y. Kolhe, a fresh graduate, was appointed to work as Acting Agricultural Overseer, Pandharpur.

There were some changes made in the subordinate staff to facilitate work. In my office, the permanent Head Clerk, Mr. P. T. Vishal, was transferred as Price Inspector on probation to the office of the Director of Agriculture, Bombay Presidency, Poona, and Mr. V. M. Khole, Assistant Superintendent of the office of the Director of Agriculture, Bombay Presidency, Poona, was appointed to work in his place from 9th January 1936.

Lines of Work.

The work of this Division is summarised under the following headings :—

(1) Research.

(2) Propaganda.

(3) Agricultural Organization :—
  (*a*) Taluka Development Associations.
  (*b*) Non-credit Societies.
(4) Agricultural Services.
(5) Miscellaneous.

Section I.

Research.

Kopergaon Farm.

Area.—The total area of the Farm is 110 acres and 19 guthas. Out of this, 40 acres and 20 gunthas were under cultivation during the year under report. Sixty acres of land was leased to the Banilla Cotton Scheme of the Indian Central Cotton Committee. About 6 acres of land was occupied by buildings, roads, etc., and the rest of the land lay uncultivable waste being chopan and water-logged.

Object.—The chief object of this Farm is to demonstrate the improved varieties and economic methods of growing sugarcane and confirm the results of the experiments of the Padegaon Research Station.

Season.—The total rainfall during the year was 19 inches and 25 cents as against 19 inches and 63 cents, the average of the past 21 years. The useful rainfall (rainfall from June to October end) amounted to 16 inches and 85 cents only. An unprecedented heavy hail-storm occurred at the end of March 1936, damaging all standing crops and trees.

The following experiments were conducted on this Farm :—

1. Trial of Cane Varieties.
2. Nitrogenous requirements of Cane.
3. Improved method of planting cane versus Local method.
4. Diversification in Cane farming.
5. Adsali cane cultivation.
6. Padegaon recommendations of new varieties.
7. Miscellaneous Experiments :—
   A. Trial of *Phaseolus trilobus* as a green manuring crop for Jowar.
   B. Trial of erect strains from the spreading varieties of groundnut.
   C. Trials of Sorghum Hybrids.
   D. Trial of Co. 2 cotton.
8. Banilla Cotton Scheme.

1. *Trial of Cane Varieties.*—Five varieties were tried in four replicates of 2½ gunthas each and the following tables give the results :—

Plant Cane.

Yield per Acre.

Name of variety.	Weight of cane in lbs.	Weight of gul in lbs.	Extraction.	Brix.	Gul to cane ratio.	Age of the crop at harvest.
						M. d.
Striped D. 109..	79,625	10,845	68·75	20·87	13·68	13 14
E. K. 28 ..	76,110	10,690	66·5	22·63	13·7	11 27
P. O. J. 2878 ..	68,615	9,460	62·5	23·63	13·7	11 17
Pundia ..	84,145	10,975	69·00	19·13	13·03	13 11
Co. 290 ..	85,750	11,240	65·5	21·23	13·12	11 24

Ratoon Cane.

Yield per Acre.

Name of variety.	Weight of cane in lbs.	Weight of gul in lbs.	Extraction.	Brix.	Gul to cane ratio.	Age of the crop at harvest.
						M. d.
Striped D. 109..	67,672	8,792	62·5	20·77	13·12	13 15
E. K. 28 ..	64,412	8,936	64·62	22·05	13·8	13 16
P. O. J. 2878 ..	88,887	11,654	62·00	22·43	13·08	13 15
Pundia ..	14,584	1,968	65·8	21·5	13·48	13 24
Co. 290 ..	92,632	11,580	60·8	20·79	12·49	11 26

Co. 290 has stood first in plant cane and second in ratoon cane. P.O.J. 2878 is an excellent ratooner and has kept up the reputation. Pundia is nearly a failure in point of ratoon. The quality of gul in case of P.O.J. 2878, Striped D. 109 and especially in Co. 290 is a bit inferior. This point requires further observations.

2. *Nitrogenous requirement of cane.*—Seven years' results with Pundia are now available. The following tables show the result of this year and the average of the last 7 years in plant cane. The ratoon trials have been stopped since last year, as Pundia has become a poor ratooner.

PUNDIA.

Plant Cane.

Yield per Acre.

100 lbs. N.		150 lbs. N.		200 lbs. N.	
Cane weight.	Gul weight.	Cane weight.	Gul weight.	Cane weight.	Gul weight.
71,308	9,668	80,968	10,888	94,000	11,575

The above figures are the averages of four replicates.

—	Treatment.	Plant cane weight in lbs. of	
		Cane.	Gul.
Seven years' average with Pundia	100 lbs. N. ..	77,421	10,058
	150 lbs. N. ..	85,587	10,857
	200 lbs. N. ..	89,907	11,315

The progressive increase with the increased doses of manure is quite marked both in this year's result as well as in the averages of the past 7 years. On an average, Pundia has given 799 lbs. more gul over 100 lbs. Nitrogen doze for the increase of 50 lbs. Nitrogen and further increase of 458 lbs. with an additional 50 lbs. Nitrogen dose ; or in other words, about 3¼ *pallas* and 2 *pallas* of gul respectively. The cost of 50 lbs. of Nitrogen is nearly Rs. 20 and if the cost of harvesting and preparing gul per *palla* be taken at Rs. 2–8–0, the net extra cost for a plot of 150 lbs. of N. will be Rs. 25–10–0. The price of 3¼ *pallas* of gul will be Rs. 39 at Rs. 12 per *palla* and if the extra cost of Rs. 25–10–0 be deducted from the value of extra gul, the net profit of 150 lbs. N. over that of 100 lbs. N. will be Rs. 13–6–0 and in the case of 200 lbs. of N. over that of 100 lbs. of N. will be Rs. 7–8–0. But there will be a good deal of residual effect of manure in the plots of higher dose of manure. From the results, it will be seen that 200 lbs. of Nitrogen as a top dressing manure is more profitable instead of 150 lbs. of Nitrogen recommended as a Standard Doze from the results of Manjri Farm and this is mostly due to the low price of oil-cakes and Sulphate of Ammonia, during the last seven years. In former years, both these manures were more costly and the prices of gul were normal. But during the period of these experiments at the Kopergaon Farm, the prices of manures being low, the higher doze of manure was found more profitable. The cultivators still apply about 300 to 350 lbs. of Nitrogen to sugarcane crop per acre and hence there is sufficient margin to reduce the doze to 200 lbs. of Nitrogen. From this year, the experiments are being conducted on E.K. 28 and those on Pundia have been discontinued. The results on E.K. 28 for this year are given below :—

—	100 lbs. N.		150 lbs. N.		200 lbs. N.	
	Cane weight in lbs. per acre.	Gul weight in lbs. per acre.	Cane weight in lbs. per acre.	Gul weight in lbs. per acre.	Cane weight in lbs. per acre.	Gu weight in lbs. per acre.
E. K. 28 Plant cane, 1935–36.	85,090	12,210	94,940	13,210	102,890	13,760

The Ratoon of E.K. 28 is maintained and the results will be available next year.

3. *Improved method of planting cane* versus *Local Method*:—

The results of past seven years' are given below:—

Year.	Method of planting cane.	Yield of gul per acre.	Cost of cultivation per acre.	Value of product per acre.	Net profit or loss.
		lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p
1929-30 ..	Improved Method ..	12,082	608 0 0	1,213 0 0	+605 0 0
	Local Method ..	13,556	948 0 0	1,340 0 0	+392 0 0
1930-31 ..	Improved Method ..	12,368	531 10 5	753 11 9	+222 1 4
	Local Method ..	12,479	763 0 9	760 6 9	— 2 10 0
1931-32 ..	Improved Method ..	11,642	505 6 0	744 5 6	+238 15 6
	Local Method ..	11,372	737 9 0	750 0 9	+ 12 7 9
1932-33 ..	Improved Method ..	11,815	485 5 0	546 7 0	+ 61 2 0
	Local Method ..	13,126	666 9 6	611 4 9	— 55 4 9
1933-34 ..	Improved Method ..	8,591	484 0 0	417 0 0	— 67 0 0
	Local Method ..	10,565	648 0 0	512 0 0	—136 0 0
1934-35 ..	Improved Method ..	8,930	494 3 0	711 3 0	+217 0 0
	Local Method ..	9,857	635 1 0	815 10 0	+180 9 0
1935-36 ..	Improved Method ..	10,756	453 3 0	512 2 6	+ 58 15 6
	Local Method ..	12,696	621 11 0	604 1 6	— 17 9 6
Average of seven years.	Improved Method ..	10,883	508 13 1	699 11 0	+190 14 1
	Local Method ..	11,950	717 2 2	770 7 11	+ 53 5 9

This is the last year of these experiments. They have decidedly shown how economic it is to grow sugarcane under improved method. The cane cultivators in general have adopted almost all the improvements suggested in the series. In the first 3 years, the price of oil-cake was very high; hence there was more difference in the profits of the two methods. In the following 2 years, the prices of oil-cake and also of gul were low and hence the profits are also low. In the 6th year, gul prices were again high and hence the profits in both the methods were

higher and in the last year, the price of gul went abnormally low and hence the net profits were low. But in all the years of the experiment, the improved methods have always given better profits over the local system and hence this method has been adopted by the public. The experiment is, therefore, discontinued.

4. *Diversification in cane farming.*—The following table shows the performance of each crop under the two series :—

I Series.

Crop.	Yield per acre, weight in lbs.	Value per acre.	Cost of cultivation per acre.	Net profit or loss.
		Rs. a. p.	Rs. a. p.	Rs. a. p.
Sann (Green matter) ..	23,840	525 12 9	441 15 0	+83 13 9
Cane (Gul)	11,032			
Ratoon		Not taken.		
Bajri (grain)	1,052	37 0 0	35 2 6	+ 1 13 6
Bajri (fodder)	2,080			
Gram (grain)	416	12 2 0	26 0 6	−13 14 6
Gram (Bhusa)	272			
Tobacco	660	82 8 0	54 2 0	+28 6 0

II Series.

Crop.	Yield per acre, weight in lbs.	Value per acre.	Cost of cultivation.	Net profit or loss.
		Rs. a. p.	Rs. a. p.	Rs. a. p.
Sann (Green matter) ..	21,200	540 2 0	451 9 0	+88 9 0
Cane (Gul)	11,340			
Ratoon		Not taken.		
Cotton	854	84 11 0	53 12 0	+30 15 0
Bajri (Grain)	960	33 8 0	37 13 3	−4 5 3
Bajri (Fodder)	1,756			
Gram (Grain)	412	11 14 0	22 7 3	−10 9 3
Gram (Bhusa)	212			

Pundia does not give a profitable ratoon and hence the ratoon taking had to be dropped. The tobacco crop inserted as money crop, yields rather inferior quality, does not find a good market and has been a failure in some years owing to unfavourable season. The series, therefore, have to be changed, and from next year, the experiments are to be based on E.K. 28 with different rotations.

5. *Adsali Cane Cultivation.*—Three varieties were tried viz., Pundia, E.K. 28, and P.O.J. 2878. Owing to the attack of frost in January 1935, the whole crop of Adsali cane had to be prematurely harvested and the ratoon of this short growth allowed to grow without any further treatment.

The results are given below :—

Yield per Acre.

Name of variety.	Cane weight.	Gul weight.	Extraction.	Brix.	Gul to cane.
Pundia ..	67,752	9,243	69·75	20·78	13·62
E. K. 28 ..	76,842	10,162	64·6	20·92	13·20
P. O. J. 2878 ..	87,290	11,476	62·9	22·11	13·17

6. *Trials of cane varieties recommended by Padegaon Research Station :—*

I Series.—A trial of Co. 360 with P.O.J. 2878 was conducted in six replicates of 2 gunthas each. The results are given below :—

Plant Cane.

Yield per Acre.

——		Weight of cane.	Weight of gul.	Extraction.	Brix.	Gul to cane.	Remarks.
Co. 360 ..	1	95,143	11,494	65·5	21·40	12·81	
	2	84,729	11,263	67·0	21·56	13·29	
	3	85,568	11,475	68·0	21·19	13·41	
	4	84,400	11,700	67·0	22·44	13·86	
	5	92,280	13,140	66·5	21·57	14·2	
	6	80,460	11,140	68·0	21·98	13·84	
Average ..	..	87,097	11,702	67·0	21·69	13·57	
P. O. J. 2878 ..	1	81,780	10,880	63·5	22·70	13·30	
	2	83,320	11,140	67·0	20·99	13·37	
	3	81,440	10,260	66·0	22·68	12·59	
	4	89,520	12,500	66·0	21·81	13·96	
	5	78,200	10,660	66·0	21·80	13·62	
	6	73,140	10,400	64·5	22·70	14·21	
Average ..	..	81,233	10,973	65·5	22·28	13·51	

Co. 360 has given better results.

II Series.—A trial of H.M. 89 with E.K. 28 and Pundia was arranged in 4 replicates of 2 gunthas each ; the following are the results :—

Plant Cane.

Yield per Acre.

		Weight of cane.	Weight of gul.	Extraction.	Brix.	Gul to cane.	Remarks.
H. M. 89 ..	1	80,380	10,360	63·5	21·24	12·88	
	2	74,408	10,103	62·5	21·49	13·27	
	3	61,043	8,033	64·0	20·69	13·15	
	4	69,980	9,580	64·5	21·45	13·66	
Average ..	..	71,453	9,519	63·9	21·22	13·24	
E. K. 28 ..	1	97,820	13,120	69·5	20·56	13·41	
	2	95,900	13,340	65·5	21·20	13·90	
	3	82,360	11,320	69·0	21·42	13·74	
	4	84,740	11,800	67·0	21·51	13·92	
Average ..	..	90,205	12,395	67·75	21·17	13·74	
Pundia ..	1	77,360	10,140	72·0	19·13	13·10	
	2	78,580	10,180	70·0	19·09	12·95	
	3	80,060	10,580	70·5	17·84	13·21	
	4	84,820	11,040	68·0	19·37	13·01	
Average ..	..	80,205	10,485	70·1	18·86	13·07	

E.K. 28 gives better results than H.M. 89 and Pundia. The ratoons of both the series have been maintained and results will be available next year.

7. *Miscellaneous Experiments.*—(*A*) Trial of *Phaseolus trilobus* as a green manuring crop for Jowar :—The experiment was conducted on the lines of last year, and the following are the results :—

	Yield per acre in lbs. Grain.	Fodder.
Green manured plot	1,335	4,539
Check plot	871	2,203

The yield of phaseolus trilobus was 17,680 lbs. per acre, green matter and the Nitrogen contents were found to be 0·40 per cent.

(*B*) *Trial of erect strains from the spreading varieties of Groundnut.*— The trials were continued this year on a larger scale and the following are the results:—

Name of variety.	Date of sowing.	Date of harvesting.	Yield of dry pods per acre.
(1) Satara Grayish ..	28th June 1935 ..	20th October 1935 ..	2,400
(2) Satara Reddish ..	Do. ..	Do. ..	1,335
(3) Tasgaon Red ..	Do. ..	19th October 1935 ..	2,329
(4) Tasgaon Reddish ..	Do. ..	Do. ..	2,120
(5) Spanish peanut ..	20th June 1935 ..	12th October 1935 ..	1,632

In addition to the above plots the Satara Greyish variety was sown on an acre plot to see its effect on a large scale and the yield was found to be 2,502 lbs. Satara Red, though erect, is a poor yielding variety, has been dropped from the list. Tasgaon Red and Reddish have been found one and the same and the trial, therefore, will be continued with the remaining two strains only.

(*C*) *Trial of Sorghum Hybrids.*—Co. 352 and Co. 356 varieties were continued this year. It has been decided to try these varieties as February and June planting. Owing to some difficulty, the February planting of the varieties was not possible. However, the ratoon of these varieties planted in March 1934 and harvested on 12th January 1935 was maintained. The ratoon was harvested on 1st December 1935. The following are the results:—

Name of variety.	Weight of cane in lbs.	Weight of gul in lbs.	Extraction.	Brix.	Gul to cane.	Period.
						M. d.
Co. 352 ..	58,023	7,665	62·84	21·8	13·22	10 21
Co. 356 ..	41,441	4,459	59·21	19·62	10·75	10 19

The same varieties were planted on 28th June 1935 and harvested on 4th April 1936. The following are the results:—

Yield per acre.

Name of variety.	Weight of cane in lbs.	Weight of gul in lbs.	Extraction.	Brix.	Gul to cane.	Period.
						M. d.
Co. 352 ..	50,208	5,736	58·5	19·33	11·42	9 6
Co. 356 ..	70,936	6,352	61·0	16·38	8·91	9 6

The June planted crop was vigorous in growth and was still growing when it was harvested. This crop, however, was damaged by hail-storm on 30th March 1936 and was stripped off, of all the foliage and was harvested immediately. The ratoon mentioned above put forth 100 per cent. arrows but in June planting there were practically no arrows.

(*D*) *Trial of Co. 2 Cotton.*—Co. 2 Cotton was tried with Banilla on 5 guntha plots. The dibbling was done on 25th May 1935. Co. 2 Cotton had to be dusted twice with Sulphur dusting to prevent the attack of Red leaf Blight and consequently no disease appeared. This is a very late variety as compared with Banilla. The staple is long and cotton is softer and has silky feel. The results are tabulated below :—

Name of variety.	Date of sowing.	Date of first picking.	Yield per acre.	Ginning per cent.	Staple length.
			Lbs.		
Banilla ..	25th May 1935..	19th October 1935.	980	40	17 m.m.
Co. 2 ..	25th May 1935..	28th November 1935.	722	37·5	23 m.m.

8. *Banilla Cotton Scheme.*—This is the second year of the Banilla Cotton Scheme started on this Farm with the help of the Indian Central Cotton Committee. Pure Banilla Cotton Seed is supplied to the cultivators on the Deccan Canals' area. The cotton crop is rotated with Spanish peanut. This year 30 acres and 20 gunthas were under Banilla cotton and 29 acres and 20 gunthas under Spanish peanut. The average yield of Banilla cotton was 733 lbs. of seed cotton per acre, while that of Spanish peanut was 1,630 lbs. of dry pods per acre. 10,000 lbs. of pure Banilla cotton seed was supplied to the registered seed growers this year. The crop of cotton was poor this year due to unfavourable weather conditions and fetched also low price on account of depressed market. The total expenditure under the Scheme amounted to Rs. 4,559–10–6 while the receipts amounted to Rs. 4,563–1–6 irrespective of the value of the stock on hand which is worth about Rs. 300.

Mohol Farm.

Season.—Unlike previous year, the season was slightly better for *Kharif* crops like groundnut and cotton. Heavy rains amounting to 10·46 inches during the last week of August, however, were injurious. The rabi season began slightly earlier, due to good rains in the first fortnight of September. The crop was fairly good till harvest, but at the time of harvest, two hail-storms, within a period of seven days, did some damage to crops. The total fall of rain was 31·95 inches.

The following experiments were conducted on this Farm, during the year under report :—

(1) Dry Farming Experiments.
(2) Jowar Breeding Experiments.

(1) *Dry Farming Experiments.*—These experiments were in continuation of last year's experiments with one change, viz., that the check or cultivator's method plot, theoretically ought to be without bunds. But it being included in the experimental series of plots, it got the advantage of bunds meant for other plots. To avoid this discrepancy, it was suggested by the Chief Investigator, Dry Farming Research Station, Sholapur, to take only central portion from cultivator's plots and take the calculated yield for comparison. This year, some of the plots in the series were damaged by *Rizactonia bataticola.* The treatments and yields per acre under comparison were as below :—

	Treatments.		
	Ploughed.	Harrowed.	Cultivator's method plot.
	Lbs.	Lbs.	Lbs.
Grain	424	410	364
Fodder	831	835	948

As suggested by the Chief Investigator, one plot of 10 gunthas was harvested from a cultivator's field, adjoining the Farm, having the same type of soil and seed etc., for comparison. The actual yield figures were as under :—

	Calculated yield per acre.	
	Grain.	Fodder.
	Lbs.	Lbs.
10 gunthas plot actually cut from a cultivator's field	154	288
10 gunthas plot on the Farm receiving cultivator's method treatme t	335	888
10 gunthas plot in the Experimental Series ..	364	948

The above figures clearly show the beneficial effect of bunding and treatments. The low yield in the cultivator's plot was mainly due to the following causes :—

(1) Want of bunding,

(2) Presence of Striga, and

(3) Presence of Smut.

(2) *Jowar Breeding Experiments—Maldandi.*—Four Maldandi strains viz., 35–1, 47–3, m–9 and 31–2, were tried, against local Maldandi, graded local and rejected seed, i.e., seed left under the sieves after grading, in

randomised block system, with six replications. Each plot was $\frac{3}{4}$ guntha. The yields per acre were as under :—

Name of strain.	Grain in lbs.	Fodder in lbs.	Remarks.
35–1	513	1,300	
47–3	528	1,428	
m–9	440	1,268	
31–2	607	1,183	
Local (ordinary Maldandi)	393	1,321	
Local graded	494	1,268	
Local rejected	469	1,503	

The results when interpreted showed that strains Nos. 35–1, 47–3, m–9 and 31–2 were significantly superior to local. Out of the above four strains, only two strains, viz. 35–1 and 47–3 are being tried in districts, with great success. The remaining two will also be tried for their suitability. The main peculiarities and behaviour of these strains for the last three seasons, i.e., 1933 to 1935, are worth noting from the following :—

Strains Nos.	Yield per guntha.			Earliness.		
	1933.	1934.	1935.	1933.	1934.	1935.
47–3 ..	15·27	17·49	9·90	Late ..	Late ..	Late.
35–1 ..	13·14	19·84	9·63	Early ..	Early ..	Early.
m–9 ..	16·28	20·35	8·25	Medium ..	Medium ..	Medium.
31–2 ..	13·46	21·02	11·38	Late ..	Late ..	Late.
Local Check.	15·95	15·26	9·27	Mid. Mixture	Late ..	Mid. late.

It will be seen from the above, that though 31–2 shows good yielding capacity, it is not good for grain size and earliness; while strains Nos. 35–1, m–9 and 47–3 are early medium and late respectively and are fairly good as regards yielding capacity and grain size. Thus strain No. 47–3 is found to do well where rainfall and soil conditions are better, while strain No. 35–1 being an early type, is suitable for shallow soils, though it can well respond to good conditions. The suitability of m–9 and 31–2 are yet to be determined. Seeds of strains Nos. 47–3 and 35–1 are being multiplied by the cultivators themselves, where the district trials were arranged in Sholapur and Bijapur.

Some of the results of yield trials on cultivators' fields in the district, were as below:—

Name of the village.	35–1.	47–3.	m–9.	Local Check.
		Yields of grain per acre.		
	Lbs.	Lbs.	Lbs.	Lbs.
Korti (Pandharpur Taluka) ..	360	240	200	250
Javale (Do.) ..	375	255	210	210
Kondai (Do.) ..	345	225	210	210
Mohol*	....	200	175	112
Bijapur	456	....	....	180

* The crop was damaged by hail-storm and stray cattle.

Dagadi Yield trials.—Three Dagadi Strains, viz. ND-15, BD-24 and BD-34, were tested against Nagar Dagadi and Bijapur Dagadi local. The results when worked, show that none of the strains are superior to local. The yield figures per acre are as below:—

Strain numbers.	Grain in lbs. per acre.	Fodder in lbs. per acre.
ND-15	845	2,680
ND-Local Check	856	2,000
BD-24	668	2,200
BD-34	776	2,360
BD-Local Check	819	2,280

The low yields of grain of Dagadi Strains may be due to the fact that the locals are mixtures of various types flowering at different times and the season seems to have been favourable to locals only.

New Selection work in Tambdi Jogadi.—Samples of Tambdi Jogadi earheads have been collected from various representative places in Sholapur District, as settled in the last " Cresco ". An initial selection of the old stock of Tambdi Jogadi, has also been made and out of 135 only 22 will be continued for next year. These, together with new collections, will be tried in single row cultures.

Selection work in Bedri.—Thirty samples of fresh Bedri type of jowar were grown last year on the Farm, with a view to start new selection. Out of these only ten selfed earheads have been retained for further study.

Ratnagiri Farm.

Season.—The season during the year was not very favourable for the rice and nagli crops. Everything went smooth till the transplanting

operations were complete. After this, the season changed altogether and only drizzling showers were received, with the result that even the low lying fields were completely dried and showed signs of cracking. This had a serious effect on tillering and the consequent outturn of the crop. The total rain-fall recorded was 94·40 inches as against 119·52 inches of the previous year.

The Farm work comprises of the following :—

1. Rice Breeding and Selection.
2. Fruit Section.
3. Vegetables.
4. Nagli work at Hatkhamba.

(1) *Rice breeding and Selection.*—The main work of the multiplication of different strains of rice was done as usual. The quantities of seed supplied during the year to registered seed growers are as under :—

		lbs.
Early (coarse) ..	Patni No. 6	2,960
	Kudai No. 25	1,380
Intermediate (medium)	Panvel No. 61	2,900
	Waksal No. 207	3,400
Late (coarse) ..	Bhadas No. 79	680
Intermediate (fine)	Kolamba No. 184	700
	Kolamba No. 401	1,685
	Total ..	13,705

Of these, the early varieties of Patni and Kudai are intended for cultivation in the Southern portion of the Ratnagiri District in the upland soils only. Panvel No. 61 and Waksal No. 207 suit the Northern tract, while Bhadas No. 79 thrives in salt lands. Kolamba Nos. 184 and 401 have been popular in Dapoli and Khed Talukas.

As reported in the last year's report, the trials of the late Varangal strains were further conducted at Chiplun. Strain No. 487 has once again proved significantly superior to the local by yielding 18·64 per cent. more gain. The other strains Varangal Nos. 420 and 448 gave an increased yield of 12·72 and 13·31 per cent. respectively over the local. The trials will be continued for a year more.

The trials of new fine Waksal selections also were given at Chiplun like last year by Fisher's method. The results corroborated those of the last year with the strain No. 1 standing significantly superior to local by giving an increase of 10·9 per cent. in the yield. The other two Fine Waksal strains No. 3 and 27 yielded 6·07 per cent and 7·00 per cent. more outturn than the local. The experiment will continue for a couple of years more.

Work on Crosses.—The three strains Nos. 17/23, 4/7 and 4/1 selected last year in the F4 generation, were further grown intensively as single plants to observe their behaviour in F5 generation. Of these, strain No. 4/7, though a big grained type has been found to be yielding even

higher than Patni No. 6 and will be hence retained to see if it would replace Patni No. 6 itself. The other strains 4/1 and 17/23 will be further grown in F6 generation.

(2) *Fruit Section.*—(*a*) Pine-apple.—(Manurial Experiments).

Last year's trials were further continued this year also. Of the different treatments, Undi-cake stands foremost, giving 13·8 per cent. more yield over no-manure treatment. Nitrogen in the form of Sulphate of Ammonia has given only a slight increase of 6·9 per cent. while the Farm Yard Manure alone has not responded at all. None of these yields show significant results and they do not corroboarate with the last year's results. The careful observations made about these treatments go to show that the quantities applied as shown in last year's report are quite insufficient for the proper nourishment of the plants. A dose of 150 lbs. Nitrogen per acre, instead of 75 lbs. seems to be quite essential.

The total area under pine-apple crop on the Farm, stands at 2 Acres and 28 gunthas as against 35 gunthas of the last year. The sale proceeds of the pine-apple fruits during the financial year 1935–36, amounted to Rs. 508–2–9 as against Rs. 125 of the last year.

(*b*) *New Introductions.*—Besides the fruit crops of Kagadi Lime, Italian Lemon, Chikoo, Banana, Guavas and Grapes grown last year, few more additions were made during the year under report by introduction of Mosambi and Santra.

All the seven varieties of Guavas introduced here, yielded fruits within 14 months from the date of planting. Lucknow No. 49 has been found to be very tasteful.

The grapes have been found a thorough success on the Farm. It is a matter of great satisfaction to note that the fruit has turned out to be of excellent taste. The analysis kindly made by the Agricultural Chemist, showed as much as 15·65 per cent. sugar contents in the fruit. Each vine of Bhokari in its first year of bearing yielded 8 to 9 bunches of good size and attractive appearance. The other varieties have not yet borne fruit.

Italian lemons have flowered profusely and it is to be seen how far the fruit would be appreciated by the public.

The Bor tree about 8 years old near the Farm Office, yielded fruits for the first time during the year under report. The tree was pruned in May and was manured with Farm Yard Manure. There was a profuse inflorescence in October, which was dusted thrice with Sulphur dust. The fruits were of excellent quality and taste. They were also very attractive and of big size. As many as 1,200 fruits were harvested from the one tree. It may be noted here that not even 5 per cent. of the fruit was damaged by borer.

All the other fruit crops are also progressing quite satisfactorily.

(*c*) *Cashewnuts.*—As reported in last year's report, an area of 37 gunthas on the Hatkhamba Farm was newly brought under " Kaju " so that the total area under this crop now stands at 5 acres. In the block representing

the transplanted and "in situ" kaju plants, planted in June 1934, it is found that the "in situ" plants have out grown the seedlings, though the latter were one year older than the former at the time of planting. It is thus obvious that planting of kaju "in situ" should alone be advocated. In the case of watered and unwatered blocks of kaju, there is now no much marked difference between the two. The watering will now be discontinued as the plants are well advanced.

(*d*) *Mango.*—The mango grafts on the Hatkhamba Farm, planted at various times since the year 1923, have not yet borne fruit. This is due to the sub-soil layer of hard rock situated only at a depth of 1 foot from the ground surface. It may be mentioned here that the grafts were originally planted in blasted pits and there being no way for the roots to penetrate freely, the growth remained stunted. It is intended to put a mud and stone wall (katta) round a few trees to see if they would thrive under that condition. The plantation of mango-seedlings "in situ" laid out in another plot in June 1934 is progressing well. The plants will be budded next year in August 1936 and the growth of scions watched with interest.

The total realization from the sale of fruits on the Farm amounted to Rs. 571-7-3 as against Rs. 200-4-6 of the previous year.

(*e*) *Nursery.*—In view of the increased demand for mango grafts and pine-apple suckers, a nursery for the multiplication of the plants was established on the Farm, during the year under report. As many as 1,000 mango seedlings were raised in pots and about 500 grafts were prepared for sale next season (June 1936). Besides the above Chikoo, Guava, Italian lemon and Kagadi lime gooties have been prepared. Grape plants, and Papaya seedlings will also be kept for sale next season. About 3,500 pine-apple suckers were sold during the year. The total income realised from the sale of nursery plants amounted to Rs. 181-12-6 as against Rs. 37-11-9 of the previous year.

(3) *Vegetables.*—The information about the important kinds of vegetables grown during the year, the area occupied by each and the income realised from them, is given in the following table :—

Kind of vegetable.	Area.	Income.	Remarks.
	Gts.	Rs. a. p.	
Brinjals	1	10 11 6	
Chillies	13	124 5 9	Inter crop in Kagdi lime.
Tondali		30 9 0	Grown on fence.
Knolkhol	7	66 5 9	
Cabbage	10	148 5 0	Part grown as inter-crop in Mosambi.
Bhendi		34 8 6	Inter crop in Pine apple.

The vegetables mentioned above, command a good sale in the local market and were therefore, grown on a fairly large scale. Trials will be given to crops like Tomato, Vegetable Chillies and Cauliflower, next year. The total sale proceeds from the vegetables on the farm went to Rs. 453-7-3 as against Rs. 403-0-0 of the last year.

(4) *Nagli work at Hatkhamba.*—The multiplication of the improved strains of Nagli—A 16, B 11, E 31, E 82, E 44 and E 62—was done on the Farm as usual. The seed has been kept pure by discriminate rouging and bagging enough earheads of each strain. The total quantity of seed distributed to the registered seed growers during the year, amounted to 594 lbs..

Section II.

Propaganda.

The principal items of the propaganda are given below :—

(1) *Treatment of Jowar seed against smut.*—The propaganda of mixing Jowar seed with sulphur dust was carried out on a very large scale with the help of the Collector of Sholapur and the following number of sulphur packest were sold during the year :—

Name of the District.	Number of sulphur packets sold.	Area estimated under treated jowar.
		Acres.
(1) Poona	2,000	10,500
(2) Satara	2,413	24,275
(3) Ahmednagar	2,800	18,000
(4) Sholapur	10,713	1,03,774
(5) Canal tract	2,400	18,000
Total ..	20,326	1,74,549

The percentage of smut varied from 3 to 18 per cent. and all the staff was fully engaged in demonstrating this method for a couple of months. The Collector of Sholapur has taken personal interest in the distribution of packets and this is why the total area under treated seed is so much increased.

(2) *Introduction of new crops and varieties.*—The work mentioned on page 84 of the last year's report was further continued and experiments of CO. 360 versus P.O.J. 2878 were conducted in 7 places—4 in cultivattors' fields and 3 in the sugar factories. The results are summarized

below. In addition to CO. 360 a new variety viz. CO. 419 has been recommended by the Padegaon Research Station and its trials have been laid out in the current year.

The following number of sets of the different varieties have been distributed during the year :—

Name of the variety.	Number of sets distributed.
(1) E. K. 28	522,250
(2) P.O.J. 2878	9,500
(3) P.O.J. 2883	11,400
(4) H. M. 89	30,700
(5) CO. 290	8,000
(6) H. M. 320	5,000
(7) CO. 360	135,500
(8) CO. 419	21,200

The area under the new varieties is automatically spreading rapidly and at the end of this year the approximate area under these varieties is as follows :—

Name of the variety.	Area on the Deccan Canals	
	Planted by cultivators.	Planted by sugar factories.
	Acres.	Acres.
(1) E. K. 28	3,850	6,150
(2) P.O.J. 2878	650	5,550
(3) CO. 290	120	2,400
(4) CO. 360	40	100
(5) H.M. 320	....	300
Total ..	4,660	14,500

The total area under sugarcane on the Deccan Canals, may be roughly 30,000 acres and thus nearly 63 per cent. of the area is now under the new varieties.

The trials of the new varieties were conducted in 7 places in 6 replications by the randomized method and their results are given below :—

Name of the Place.	Average yield per acre:			
	CO. 360		P.O.J. 2878.	
	Weight of cane.	Weight of Gul.	Weight of cane.	Weight of Gul.
	Tons.	lbs.	Tons.	lbs.
(1) Kopergaon Farm ..	38	11,700	36·26	11,050
(2) Pravara Canals ..	39	9,282	37	10,471
(3) Godavari Canals ..	48	12,200	49·51	12,340
(4) Nira Left Bank Canal ..	43·7	13,120	44·6	13,030
(5) Kalamb sugar factory ..	61·5	gul was not prepared.	48·0	gul was not prepared.
(6) Belvandi sugar farm ..	44·48	Do. ..	43·47	Do.
(7) Rawalgaon sugar factory ..	50·5	Do. ..	41·4	Do.

From the above statement, it will be seen that CO. 360 is one of the promising varieties both for gul and sugar manufacture.

(3) *Introduction of Banilla Cotton.*—The work mentioned on page 85 of the last year's report was further continued. Although the total area of seed growers was about 1,000 acres, nearly half of this crop was required to be grubbed up due to a severe attack of cater-pillars in the early stage and some of the area was dibbled with local seed for filling gaps. Hence the total area of pure seed was only 250 acres, which produced 64,375 lbs. of pure seed and it was distributed to general cultivators to sow 5,000 acres. During this year, the average yield of irrigated cotton was not more than 700 lbs. of Kapas per acre and the last 2 pickings were spoiled by heavy rain. Hence the total quantity of sound reliable seed was small. The dry crop was almost a failure as the average yield was not more than 200 lbs. of Kapas per acre.

The Banilla cotton seed distribution Scheme, mentioned in the last year's report and conducted with the grant of the Indian Central Cotton Committee, was further continued for the second year. A short summary of this work is given under the Research of the Kopergaon Farm, During this year, the average yield of Banilla cotton was 733 lbs. of seed cotton per acre, but the yield of Spanish peanut was fairly good, viz. 1,630 lbs. of nuts per acre, and thus there was no loss in this Scheme. The total profit of this scheme was Rs. 300. The total quantity of Banilla seed available was 10,000 lbs. which was supplied to seed growers for 500 acres.

The experiments with artificial manures on irrigated cotton were conducted, but on account of low price of cotton, the extra yield has just paid the price of extra manure.

(4) *Groundnut.*—The spread of groundnut is going on in all the districts, as it is one of the remunerative crops. But the tendency of the cultivators is not to increase the area under Spanish peanut due to the fall in prices during the year 1934–35. The Department has now evolved 2 new erect varieties from the spreading groundnut and they appear to be very promising, even when compared with spreading varieties. They are Satara Gray and Tasgaon Red, which are earlier and have got all other characters of Spanish peanut. The comparative yields are given below :—

Name of variety.	Yield of nuts per acre in lbs.
(1) Spanish Peanut	1,600
(2) Big Japan spreading variety ..	2,120
(3) Satara Gray (new erect strain) ..	2,400
(4) Tasgaon Red (new erect strain) ..	2,300

The new varieties do not require the expenses of digging as in the case of spreading varieties and they mature within 4½ months.

The experiments conducted with 200 lbs. of Superphosphate or groundnut could not pay the extra cost as the prices were low.

(5) *Akola Bajri.*—The Akola Bajri is still in demand as it gives higher yield than the local Bajri. During this year, 10,200 lbs. of fresh seed was supplied to Poona and Nagar Districts where it has given 15 to 25 per cent. more yield.

During this year, there is a strong tendency of the cultivators to try African Bajri, which is advocated by Navanagar and Jamnagar States. It was tried in several places and has done exceedingly well where there were irrigation facilities. The comparative yields of some places are given below :—

Locality.	Yield per acre.			Remarks.
	African Bajri.	Akola Bajri.	Local Bajri.	
	lbs.	lbs.	lbs.	lbs.
1. Khed (Dist. Poona)	1,840	1,260	1,050	Irrigated.
2. Vadgaon	1,440	..	875	Do.
3. Pravara Canals	1,060	..	940	Do.
4. Godavari Canals	569	..	792	Dry.
5. Nira Left Bank	1,800	..	1,200	Irrigated.
6. Nira Right Bank	2,912	..	896	Do.

It is, however, noted that the Chaff of African Bajri is not very succulent and the grain is more coarse. From the analysis of African and Local Bajri, it was observed that the former contains 1 per cent. less albuminoids and more woody fibre. Further trials are necessary, before drawing any conclusions. The African Bajri is late by 2 to 4 weeks and and thus it becomes a target for all the birds.

(6) *Pusa Wheat.*—The natural spread of Pusa No. 4 wheat is going on and during this year 10,000 lbs. of Pusa 4 were distributed. It was, however found that this wheat is deteriorating and losing its character of rust resistance. Hence attempt was made to order Pusa No. 111 which was equally good. But on account of the hot-water treatment, its germination power was lost and the real advantage could not be seen.

In Ahmednagar District, 3 new strains of Niphad Farm were tried with local wheat and their results are given below :—

Locality.	Yield per acre.			
	Strain No. 168	Strain No. 808	Strain No. 809	Local.
	lbs.	lbs.	lbs.	lbs.
Nagar	418	660	638	319
Parner	500	560	640	316
Shevgaon	613	516	..	490
Shrigonda	308	384	384	220

Strains No. 808 and 809 appear to be superior to local but they are not immune to rust.

(7) *Improvement of Rice.*—In Ratnagiri District, the rice strains No. Patni 6, Panwel 61, Bhadas 79 and Kolamba Nos. 401, 184 and 42 were supplied to 185 seed growers. The total quantity of seed supplied was 16,310 lbs., which was sufficient for 260 acres. They produced 3,00,000 lbs. of seed, which was supplied to 5,000 acres of the general cultivators. Besides there is a very large area under these strains by natural spread. It was settled that each Taluka should have 50 acres under pure seed from the Ratnagiri Farm and this seed should be supplied to 500 acres in the same Taluka in the 2nd year, while in the 3rd year, seed for 5,000 acres should be supplied and thereafter, the seed should be given to general cultivators. The Collector of Ratnagiri has agreed to pay the incidental charges of these different stages and the work is to be done with the help of 10 Taluka Development Associations. Attempts are also made to concentrate the work in a few villages of each Taluka. During this year, Ratnagiri, Rajapur, Dapoli, Malwan, Devagad and Chiplun Talukas have undertaken this work. But the supply of seed from Ratnagiri Farm is too limited to supply the seed for 500 acres every year and a system of subsidised seed farms must be brought into action.

During this year a new Kolamba Strain No. 540 was tried in 3 places in the Ratnagiri District and it has given 21 per cent. increased yield over the local, Panwel or Varangal. The grain of this new strain is superior and fetches 25 per cent. more value. Further experiments are necessary to draw definite conclusions. In the Akola Taluka of Ahmednagar District, Kolamba No. 184 and 540 were tried in 4 places and they have given 10 to 12 per cent. more yield over the local Raibhoj and Jiresal.

(8) *Improved Nagli Strains.*—The Nagli Research was closed at Hatkhamba and only the multiplication of pure strains is now in progress.

During this year 2,100 lbs. of Nagli strains viz. A16, B11, E31 and E62 were supplied to 96 Registered seed growers for 225 acres, which produced nearly 1 lakh lbs. of seed. Half of this seed is again distributed to a another set of seed growers for 5,000 acres. In Devagad and Rajapur Talukas, 4,000 lbs. of pure seed was distributed for further multiplication under the control of Taluka Development Associations.

(9) *Dry Farming.*—During this year, the progress of dry farming methods in Poona District was continued. Although the total area under this method has not much exceeded 3,000 acres, still wide sowing with 15″ drill and interculturing has been adopted by a large number of cultivators, throughout the whole District. Shirur Peta and Indapur Talukas are specially selected for this work. In Ahmednagar and Sholapur Districts, the total rain-fall was above normal for the last 2 years and people have not realised the advantages of dry farming methods.

(10) *Seed Grading.*—This item of improvement is further continued and the following seeds were graded before sowing :—

Kind of seed graded.	Quantity of seed graded in					
	Poona District.	Nagar District.	Sholapur District.	Satara District.	Canal Tract.	Total Quantity.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Bajri ..	7,320	8,000	..	1,440	..	16,760
Jowar ..	23,830	24,020	2,27,000	84,205	1,00,000	459,055
Wheat ..	5,900	8,980	7,250	..	..	22,130
Groundnut ..	..	..	5,250	..	..	5,250

(11) *New Jowar Strains.*—The new jowar strains evolved at Mohol Farm, were tried in Sholapur, Ahmednagar and Canal tracts and their results are given below:—

Locality.	Name of the strain.	Average yield of all the plots.	
		Yield of grain per acre in lbs.	Fodder in lbs. per acre.
Nagar District	Dagdi 15 ..	477	....
	Local ..	383	....
Pandharpur	47-3	240	....
	35-1	360	....
	m-9	210	....
	Local ..	200	....
Sholapur	47-3	675	....
	35-1	730	....
	m-9	715	....
	Local ..	550	....
Baramati (Irrigated crop)	47-3	1,691	3,535
	35-1	2,046	4,890
	Local ..	1,550	4,513

From the above results it will be seen that the new strains of jowar are really useful for different tracts.

(12) *Soya Beans.*—The cultivation of Soya beans is gradually increasing although there is no regular market for this commodity. There is a necessity of a regular propaganda for advocating its use on account of its rich nutritious value. The yields recorded in South Central Division are given below :—

Locality.	Yield per acre in lbs.	
Ambejalgaon	448	
Arjunsond	675	
Kotri	500	
Shivapur	520	
Kondanpur	680	
Khed	1,520	(Irrigated).
Chas	1,056	Do.
Kurali	1,128	Do.
Baramati	1,320	Do.

(13) *Crop Pests and Diseases.*—In the Ratnagiri District, due to heavy rains in October 1935, the mango crop was late and very badly attacked by hoppers and mildew and dusting with sulphur had to be done 3 or 4 times. But it was rather impossible to cope with the work of dusting with 150 dust guns available in this District. Orders for nearly 35 more dust guns were received, but the stockist, Messrs. Dharamsi Morarji Chemical Company could not supply more than 15 guns. Thus the work was carried out by dusting sulphur in coarse cloth. In all 60,000 grafted mango trees were dusted and about 30 tons of sulphur was distributed.

In the Poona District, there was no serious attack of rust on Kharif Potatoes as the rainfall was insufficient. But peas were affected by mildew while jowar was affected by sugary disease. Figs were attacked by rust. The plantains were affected by Panama disease and a new root disease has been found affecting the orange and mosambi trees. In Khed-Shivapur centre about 250 acres of peas were dusted with sulphur, while 55 acres of cabbage were sprayed with Fish Oil Rosin wash soap for Aphis.

On the Canal tract, the irrigated cotton was very badly affected by green cater-pillar in the early stage and in some places, the crop was required to be resown. Gaps were filled in 3 or 4 times and thus the growth was very uneven.

(14) *Fruits and Vegetables.*—This is one of the important items of improvement and the cultivation of fruit trees is rapidly increasing. The Talegaon nursery men had supplied 2·5 lakhs of plants this year in the Bombay Presidency ; while the staff of the Poona District have supplied 8,750 plants. In Satara District, 9,075 plants of oranges, mangoes, Mosambis and Pomegranates etc., were supplied. On the Deccan Canals, about 5,700 Mosambi plants were distributed. In the

Ratnagiri District 3,000 mango grafts, 1,000 orange and cocoanut plants, about 1 lakh seedlings of vegetables were supplied.

During this year special arrangement was made to supply Italian Potato seed to the cultivators of Poona District. About 12,000 rupees worth potatoes were ordered from Italy and supplied to the cultivators at a cost of Rs. 8-4-0 per cwt. in Khed, Manchar and Ambegaon Peta when the price of this seed in Bombay varied from Rs. 13 to Rs. 14 per cwt. Thus the cultivators derived net advantage of Rs. 6,000 in this transaction. The Collector of Poona and the Revenue Officers of Khed and Ambegaon helped this transaction, in collecting advances and distributing the seed. The seed was very good and produced excellent crop. The transaction of the last three years has created confidence among the public and they are prepared to place large orders in the next year.

(15) *Sugar-making by open pan process.*—During this year the prices of gul had gone very low viz. Rs. 9 to 11 per *palla* of 250 lbs. and hence it was very difficult to make up the cost of cultivation by manufacture of gul. In the beginning the cultivators were striving for better price but when the expectations failed they began to devote their attention to the manufacture of sugar and molassine gul from February 1936. During the last two years, i.e. in 1933 and 1934, the prices of gul were good and hence sugar-making by open pan process was discontinued. But during this year again this work was started and in about 12 places, they manufactured sugar and gul. On the Pravara Canals, this work was done on a large scale. The average figure of the work on this Canal is given below :—

The following are the details of one ton of cane (E.K. 28 variety) :—

(1) Weight of cane		2,240 lbs.	
(2) Extraction of juice		70 per cent. wt.	
		1,568 lbs.	
(3) Brix		21·21	
(4) Weight of Rab		320 lbs. Struck at 110° C.	
(5) Weight of first sugar		130 lbs. (dry).	
(6) Weight of molasses		186 lbs.	
(7) Weight of gul from above molasses		170 lbs.	
(8) Recovery of first sugar		5·8 per cent.	
(9) Value of 130 lbs. of sugar at Rs. 8-8-0 per maund	Rs. 13	a. 13	p. 0
(10) Value of 170 lbs. of molassine gul at Rs. 7-8-0 per *palla*	5	1	6
Total	18	14	6
(11) Cost of manufacture of sugar and molassine gul from 1 ton of cane	4	8	0
(12) Cost of 1 ton of cane	10	0	0
(13) Excise duty on sugar	1	2	6
Total	15	10	6
(14) Net profit	3	4	0

Thus if the yield of cane is 40 tons per acre, the manufacture of sugar and gul realised the profit of Rs. 130 per acre. On the contrary, if he had manufactured gul alone, he could have got 40 *pallas* of gul and if this was sold at Rs. 10 per *palla* he would have realised Rs. 400 which was hardly sufficient to meet the cost of cultivation and manufacture of gul.

The sugar-making plant of the Department was given to Brihan Maharashtra Syndicate at Boregaon where they had got 75 acres under E. K. 28 and P.O.J. 2878. The Syndicate was unable to order up-to-date sugar machinery (Vacum pan process). Hence they wanted to take advantage of the open pan process at least for a year or two. The whole plant was therefore given to this Syndicate. The machinery was erected under the supervision of the Mechanical Assistant of the Department and the work of making sugar and molassine gul was done under the instructions of the Deputy Director of Agriculture, S. C. D., Poona. In all, the plant was working for more than 4 months and the summary of the results is given below :—

The cane was overripe and badly lodged. Hence the extraction of juice varied from 65 to 67 per cent. Further the purity of juice had gone down. The recovery of first sugar from Rab varied from 38 to 40 per cent. while the recovery of first sugar to cane varied from 5·5 to 6 per cent. The molasses were converted into gul. In the beginning, the molassine gul was of good quality and fetched only annas 8 to 12 less per maund than the price of best gul. But as the season advanced good gul could not be prepared without the addition of fresh juice.

The sugar of the open pan process fetched very good price viz. Rs. 9-4-0 to Rs. 9-6-0 per maund and this was equal to a vacum pan factory made sugar. The trials conducted with active carbon for clarification of juice resulted in increasing the per cent. of first sugar to 8·2 on cane and this was a great encouraging factor. But the process of filtration is very slow and laborious and special arrangement to hasten the process is necessary. The active carbon worked very satisfactorily and the sugar obtained was just like "Dupeta" sugar.

(16) *Sugar Factories.*—During this year all the factories numbered on page 90 of the last year's report were working to their full capacity. But in addition the Belwandi Sugar Co. Ltd. had also erected a plant of 150 tons capacity and crushed nearly 400 acres of cane. Thus there are now 8 up-to-date sugar factories in the Deccan. A short summary of the work done by each factory is given below :—

(1) *The Belapur Co., Ltd.*—The total area under cane is 2,752 acres. The total quantity of sugar produced is 11,000 tons.

(2) *The Marsland Price Sugar Factory at Kalam.*—The total area under cane is 1,600 acres. The total quantity of sugar produced is 4,500 tons.

(3) *The Saswad Mali Sugar Factory at Akluj.*—The total area under cane is 1,190 acres. The total quantity of sugar produced is 3,020 tons.

(4) *The Maharashtra Sugar Factory at Khandala.*—The total area under cane is 1,200 acres. The total quantity of sugar produced is about 5,427 tons.

(5) *The Ravalgaon Sugar Factory, Ltd.*—Total area under cane is 1,050 acres. Total quantity of sugar produced is 3,700 tons.

(6) *The Phaltan Sugar Works, Ltd.*—Total area under sugarcane is 1,502 acres. Total quantity of sugar produced is 5,050 tons.

(7) *The Kolhapur Sugar Mills, Ltd.*—Area under sugarcane is 929 acres. Total quantity of sugar produced is 4,886 tons. The Company has purchased 22,000 tons of cane from outside.

(8) *The Belwandi Sugar Farm, Ltd.*—The total area under cane is 343 acres. Total quantity of sugar produced 1,532 tons.

The sugar manufactured by the open pan process must be about 400 tons this year in all the 12 factories.

(17) *Shows and Demonstrations.*—During this year 14 big shows, 332 demonstrations, 125 agricultural meetings, 29 magic lantern lectures and 13 Jamabandi meetings were held in this Division. Some of the shows and demonstrations had to be cancelled on account of the sad demise of His Majesty, King George V.

In the Poona District 2 big shows were held ; one at Kondanpur and other at Shivali which were attended by 12,000 people. Kondanpur show was presided by the Collector of Poona.

In Ahmednagar District a fairly large show was arranged at Jeur which was opened by His Excellency the Governor of Bombay. Besides 5 shows were arranged at Shevgaon, Shrigonda, Pimpalgaon Karjat and Puntamba which were attended by 5,000 cultivators. These were opened by the Collector and Assistant Collectors of Ahmednagar.

In Satara District, 3 big shows were arranged at Khatgun, Nagoba fair and Anewadi which were visited by 20,000 people. These were opened by the Collector of Satara.

In Sholapur District, a big Cattle and Agricultural Show was arranged at Gadda fair which was presided by the Collector of Sholapur. About 10,000 people attended the show. A grand show was arranged at Karmala but due to the sad demise of King George V, it was cancelled at the last moment.

In Ratnagiri District 2 big shows were organized at Kanakeshwar and Ganapati-Pule which were presided by the Prant Officer. About 5,000 people attended these shows.

(18) *Agricultural Classes.*—During this year 5 Agricultural Classes were arranged by the Village Improvement Committee, Satara and Sholapur Districts, and the Department of Agriculture co-operated with them. At Sholapur, a special class was arranged from 1st to 16th May 1936 which was attended by 72 students. In Satara District special Agricultural Classes were arranged at Panchgani, Helwak, Sayagaon and Satara which were attended by nearly 400 students. At Satara special training was given about Land Development, Horticulture and Dairy and this class was attended by 260 students. The class was opened by the Director of Agriculture, B. P., Poona, and closed by the Honourable Minister of Agriculture on the 15th June 1936.

Besides 25 one or two days classes were held on the Canal tracts which were very useful in introducing agricultural improvements of the irrigated crops.

(19) *Rural Uplift work.*—The work of rural uplift was carried with great activities in all the 5 districts of South Central Division. But the work in Sholapur and Satara Districts deserves special mention. In Sholapur Rs. 2,800 were given to Taluka Development Associations and Rs. 500 have been spent for the improvement of seeds. Rs. 410 were spent for Shows and Rs. 502 were spent for magic lantern slides and gramophone records. In Satara District, Rs. 290 have been spent for Poultry and Rs. 650 for Cattle Breeding, and Rs. 400 for Agricultural Shows and Demonstrations. In Poona District, Rs. 3,000 have been given to new Taluka Development Associations and Rs. 1,050 for the improved seeds and implements and Rs. 300 for pig killing and Rs. 6,000 have been ear-marked for Cattle and Poultry breeding. In Ahmednagar District Rs. 3,500 have been given to new Taluka Development Associations, Rs. 600 for improved seeds while in Ratnagiri District Rs. 325 have been given for purchase of dust guns and Rs. 1,100 for nurseries of timber trees and vegetable seedlings and the remaining grant of the Village Improvement Committee has been reserved for the coming year. The Deccan Agricultural Association has conducted the work of Rural uplift in the Khed-Shivapur centre and has increased the scope of work by organising new primary schools, village Panchayats, medical help, sanitation, roads and agricultural improvements, etc. in all the 14 villages.

(20) *Demonstration Plots.*—During this year the following number of demonstration plots were arranged in South Central Division :—

(1) Canal tract	404
(2) Poona District	154
(3) Sholapur District	103
(4) Satara District	30
(5) Ahmednagar District	196
(6) Ratnagiri District	120
Total ..	1,007

(21) *Supply of seeds, manures, implements, etc.*—During this year the following articles were distributed in South Central Division.

Name of Article.	Poona District.	Ahmed-nagar District.	Sholapur District.	Satara District.	Canal Tract.	Ratna-giri District.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Cotton seed		20,735	4,400	1,200	35,000	..	61,335
			Sets.	Sets.	Sets.		Sets.
Sugarcane sets		..	165,000	15,000	707,200	..	887,200

Name of Article.	Poona District.	Ahmednagar District.	Sholapur District.	Satara District.	Canal Tract.	Ratnagiri District.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Wheat ..	2,100	2,300	3,500	3,120	15,000	..	26,020
Sann ..	2,200	..	440	750	85,000	..	88,390
Soyabeans ..	200	100	240	425	..	160	1,125
Jowar ..	..	2,900	3,350	..	3,000	..	9,250
Bajri ..	1,200	8,500	120	800	1,000	..	11,620
Potatoes ..	135,000	300	160	3,200	..	300	138,960
Rice ..	..	1,100	..	400	..	135,000	136,500
Nagli ..	..	..	..	100	..	12,000	12,100
Groundnut ..	1,000	450	..	1,000	9,000	..	11,450
Lucerne ..	..	2,000	..	..	..	..	2,000
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Sulphate of Ammonia ..	30	10	3	10	2,000	275	2,328
Nicifos ..	2	1½	..	1½	3	2	10
Super Phosphate ..	8	1½	..	1	5	1	16½
Bone meal ..	..	10	21½	1½	10	3	46
Oilcake ..	..	1	20	5	..	..	26
						Mds.	Mds.
Common salt (Denatured Salt)	..	..	..	..	..	2,710	2,710

(22) *Publications.*—During the year under report, the following two leaflets were completed :—

Serial No.	Name of leaflet.	English.	Marathi.
(1)	Cultivation of Pine-apples	1	..
(2)	Substitutes for prickly pear as hedge plant ..	..	1

In addition to the above, several leaflets were received from the Director of Agriculture, Bombay Presidency, Poona, for corrections and this work was duly attended to. Besides, as usual, the staff continued to contribute articles to the "Shetki and Shetakari" magazine and also to the "Agricultural College Magazine". Contributions were also made to the "Times of India" for "Agricultural Topics".

Section III.

Agricultural Organization.

(1) *Taluka Development Associations.*—During this year a vigorous propaganda was made to organize 25 new Taluka Agricultural Development Associations in South Central Division. The total number of old Taluka Development Associations was 22 during the last year. But this number has reached 46 by the end of June 1936. Thus it will be seen that there is a Taluka Development Association in each Taluka and Peta of Satara, Poona and Sholapur, while in Ratnagiri and Ahmednagar, there are 8 and 10 Taluka Development Associations. This work of organizing Taluka Development Associations was facilitated by the donation of Rs. 500 from Village Improvement Committees for each new Association. Most of the new Associations have collected more than Rs. 1,000 to begin with and it is presumed that this work will be going on on right lines. The names of Taluka Development Associations in each district are given below :—

(1) *Poona District*	.. (1) Haveli, (2) Purandhar, (3) Indapur, (4) Shirur, (5) Dhond, (6) Junnar, (7) Khed, (8) Maval, (9) Ambegaon.
(2) *Satara District*	.. (1) Satara, (2) Koregaon, (3) Karad, (4) Patan, (5) Walwa, (6) Tasgaon, (7) Khanapur, (8) Khatav, (9) Man, (10) Javli, (11) Mahableshwar, (12) Wai.
(3) *Sholapur District*	.. (1) Sholapur, (2) Barsi, (3) Madha, (4) Karmala, (5) Pandharpur, (6) Sangola, (7) Malsiras.
(4) *Ahmednagar District*	.. (1) Nagar, (2) Rahuri, (3) Kopergaon, (4) Newasa, (5) Sangamner, (6) Akola, (7) Shevgaon, (8) Jamkhed, (9) Karjat, (10) Patherdi.
(5) *Ratnagiri District*	.. (1) Ratnagiri, (2) Rajapur, (3) Malwan, (4) Devgad, (5) Vengurla, (6) Sangameshwar, (7) Chiplun, (8) Dapoli.

(2) *Non-Credit Societies.*—(*i*) The Agricultural Requisite Society at Malsiras has opened 6 centres on the Nira Right Bank Canal and has got 79 iron ploughs and 4 cane mills in their stock. This Society has realised Rs. 763 in the form of hire of these implements as against the amount of Rs. 652 of the last year.

(*ii*) The Vadapuri Seed Society has distributed 21,866 lbs. of seeds of jowar, wheat, groundnut, etc., among 75 members of this Society.

(*iii*) The Nimbut Co-operative Crushing Society has crushed 56 acres of cane and has realised a nett income of Rs. 2,250 during the year.

(*iv*) The Shevgaon Agricultural Requisite Society has realised a hire of Rs. 3,194 for their implements. This society has kept 247 ploughs on hire.

(*v*) Patherdi Agricultural Requisite Society has received Rs. 2,096 as hire of implements.

Section IV.

Agricultural Services.

1. *Engineering Advice and Assistance.*—The following works were undertaken during this year :—

(*i*) 15 B. H. P. Blackstone Horizontal Diesel Engine type LSI : Vasant Cane Mill ; 45 Chattanooga Mill ; Countershaft 16 feet × 2½ inches ; 1½″ Centrifugal Pumps No. 2 for juice and water : 2 Masonary tanks and Corrugated iron shed over the machinery for Mr. Krishnaji Khanduji Ghule, Patil of Manjri Budruk, taluka Haveli, district Poona.

(*ii*) 2 Single roller Macarthy Cotton Gins with 5 bearings 1½″ size ; Vasant cane mill and 32 ft. × 2½″ Countershaft and Corrugated iron shed for the Kopergaon Farm, Kopergaon, district Ahmednagar.

(*iii*) 44 Chattanooga mill and 6½ B. H. P. Blackstone Standard Kerosine oil engine for Mr. Nivriti Bhaguji Ghule of Manjri Budruk, taluka Haveli, district Poona.

(*iv*) 18 B. H. P. Blackstone Cold Start Crude Oil Engine ; Hemant Cane Mill ; 1½″ Centrifugal Pump for Juice ; 3 Sugar Centrifugal Machines ; Pug Mill ; 1 Sugar Grinder and 36 ft. × 2½″ Countershaft and the complete plant fitted on girder frame with corrugated shed over the machinery.

2 Complete multiple furnaces for Rab making for the Brihan Maharashtra Sugar Syndicate Ltd., at Borgaon, taluka Malsiras, district Sholapur.

(*v*) 45 B. H. P. Blackstone Cold Start Crude Oil Engine, 6 Roller American Mill etc., for Mr. Raghu Sadu Jagtap of Khoker-Bhoker, near Belapur, district Ahmednagar.

(*vi*) Advice in the erection of 2 of 5 roller and one of 3 roller Massys' Mills given to Mr. Chandrabhan Rupchand Dakle of Belapur near Nursery, district Ahmednagar.

(*vii*) 92 Chattanooga Mill and 22 ft. × 2½″ Countershaft to Mr. Nanasaheb Jagtap near Umbergaon, near Belapur, district Ahmednagar.

(*viii*) Advice in the erection of 10″ Centrifugal Pump for Mr. Bapu Raghu Borawake at Esgaon-Khirdi, near Kopergaon, on a well.

(*ix*) 4" Centrifugal Pump and 12½ B. H. P. Engine for Mr. Pingle of Mundhwa near Poona.

(*x*) New Design by Mr. Peter Rahater, Mech. Assistant, S. C. D., during the year was an improved fire grate and scraper for rab and gul furnaces tried and proved to be more useful.

2. *Land Development.*—The post of the Bunding Officer was revived from 1st April 1935 and he attended the following work :—

(1) Application of tagai loan for land development :—

STATEMENT A.

Serial No.	Name of District.	Number of applications.			
		Received.		Disposed off.	
		Number.	Amount.	Number.	Amount.
			Rs.		Rs.
1	Poona District	10	5,600	7	3,500
2	Sholapur „	2	1,800	1	1,000
3	Satara „	2	1,800	1	1,000
	Total ..	14	9,200	9	5,500

(2) Applications from private individuals with private funds :—

STATEMENT B.

Serial No.	Name of District.	Number of applications.		
		Received.	Disposed off.	Balance on hand.
1	Poona District	31	15	16
2	Sholapur „	27	12	15
3	Ahmednagar „	41	15	26
4	Satara „	10	9	1
5	Bijapur „	2	....	2
	Total ..	111	51	60

It was always laid down that the applications from the private individuals who had money ready with them to execute—construct—the schemes and who were keen to do so, were given preference and they were attended to first. This is in fact to render help to the needy ones at the right time. For it has been learnt by experience that if a cultivator is not given timely help, he will do the work himself in his own way without waiting for the advice, if it is to take some time or he will spend the money on some other items.

The following works are very instructing and worth mentioning :—

(1) Soaking Compartments of Mr. Bhujbal at Talegaon Dhamdhere (Poona District) :—

This scheme is worked exactly on similar principles as the soaking compartment scheme at Belvandi (Ahmednagar District) to utilize the surface run-off water from a greater catchment area on a lesser area which is bunded. This ensures Rabi crops, but the compartments here can be flooded at a desired time by providing necessary inlets and outlets for water to pass to each of the selected compartments. This is the first scheme of the sort which will serve the purpose of a model scheme in the famine area.

This scheme has been constructed on one side only of a small water-course, since the land on the other bank does not belong to the owner of this scheme nor the other man could join hands with him due to want of financial aid. Had it been done in co-operation with the other man, the cost would have been much reduced with an increased advantage for both. The total cost of the scheme is about Rs. 3,000.

(3) *Joint Bunding Schemes.*—(1) A scheme of a Joint Bunding across a Nala on the boundary of two villages viz., (*i*) Alegaon and (*ii*) Medsingi in the Sangola Taluka of Sholapur District has now been constructed at a cost of Rs. 1,500 only. This has been possible only due to the co-operation of three different cultivators who owned lands on either banks of the Nala. Thus the benefit can be derived by all the three with comparatively less capital investment.

(2) The efforts are being made to induce the members of the Mulegaon Bunding Society (Sholapur District) to get their fields bunded. So far only five (5) members have expressed their desire to bund an area about 40 acres. It is to be seen now to what extent the success in this can be achieved.

(3) Two Bandhara schemes across the village Nalas, proposed by the Local Village Improvement Committee at (*i*) Gulamb in Wai Taluka and (*ii*) Javalwadi in Satara Taluka, both in the Satara District, have been surveyed, but the execution of these works is entirely a matter depending on the funds to be made available either by the Rural Uplift Committees or by the villagers themselves by forming a Co-operative Society for the purpose.

The necessity of a Bunding Officer was badly felt as the cultivators could not get technical help in time for development of their lands.

Applications for his services from all the 4 Deccan Districts have been received and it was found impossible to cope up with the work unless some additional help is secured. It is gratifying to note that the Collectors and Presidents of Village Improvement Committees, Sholapur, Ahmednagar and Poona, have agreed to provide funds for entertainment of a Sub-Overseer for each district.

Section V.

Miscellaneous.

Co-ordination with the officers of other Departments.—During this year there was a hearty co-operation with Revenue, Irrigation and Co-operative Departments and also with the District Local Boards, District School Boards and individual centres of Village Uplifts. The District Agricultural Overseers are members of the District Village Improvement Committees and the Collectors and Presidents of these Committees have considered the proposals of Agricultural Schemes more sympathetically. Several classes of village guides were conducted in full co-operation of the Departments and liberal grants were given to the new Taluka Agricultural Development Associations both by the Village Improvement Committees and the District Local Boards. Most of the Agricultural Demonstrations were presided over by the officers of the Revenue or Irrigation Department and attempts were made to redress the grievances of the cultivators.

Deccan Divisional Board of Agriculture.—Charge of the Chairmanship of the Deccan Divisional Board of Agriculture came over to me from 1st November 1935 and since then two meetings of the Board were held at Poona and Ratnagiri. The non-official members of the Board took very keen interest in the deliberations of the meetings and all of them deserve special thanks of the Department for the services rendered by them.

V. V. GADGIL,
Deputy Director of Agriculture,
South Central Division,
Poona.

Poona, 18th August 1936.

Programme of work for the year 1936–37 in the South Central Division.

Research.

Kopergaon Farm.

(1) Varietal trials of Cane.
(2) Nitrogenous Top Dressing experiments with reduced doses.
(3) Diversification in Cane farming.
(4) Adsali Cane planting with Pundia, E. K. 28 and P.O.J. 2878.
(5) Confirmatory trials of experiments from Padegaon Research Station.
(6) Trials of Cotton and Groundnut varieties, and multiplication of seed.
(7) Miscellaneous experiments on fodder and other crops under Irrigation.
(8) Trials of Agricultural Machinery.
(9) Compost making.

Mohol Farm.

(1) To continue yield test of Maldandi and Dagadi strains on the Farm.
(2) To arrange multiplication of seeds of 35-1 and 47-3.
(3) To continue breeding investigations in Tambdi Jogadi and Bedri types of jowar.
(4) To continue Dry Farming Experiments.
(5) To try Madras Cotton in Rabi season.
(6) Miscellaneous work such as multiplication of seeds.

Ratnagiri Farm.

(1) Multiplication of the improved Rice strains as usual.
(2) Late Varangal strains and New Fine Waksal strains to be grown by Fisher's method at Chiplun.
(3) To continue the work on Crossing (Patni No. 6 × Kolamba No. 79).
(4) Manurial experiments on pine-apple to be continued.
(5) Nursery for mango grafts, chikoo and guava gooties and pine-apple suckers to be continued.

Hatkhamba Farm.

(1) Multiplication of the improved Nagli strains Nos. A16, B11, E82, E44 and E62, as usual.
(2) Budding of newly planted seedlings of mango in-situ.
(3) Introduction of Bor on the varkas lands of the Hatkhamba farm.
(4) Varkas Land Development Problem.

PROPAGANDA.

(1) The work mentioned on page 102 of the Annual Report of the year 1933-34 will be continued and special attention will be given to the following items :—

(*i*) Trial of new cane varieties and extension of varieties like P.O.J. 2878, E. K. 28, Co. 290, etc.
(*ii*) Trial of Superphosphate on cane.
(*iii*) Extension of the manufacture of sugar by open pan process and trial of active carbon.
(*iv*) Extension of Banilla Cotton and trials of Verum strains.
(*v*) Introduction of new erect varieties of groundnut.
(*vi*) Extension of Pusa wheat.
(*vii*) Organisation of cotton markets.
(*viii*) Technical help for all Land Development Schemes.
(*ix*) Extension of rice and nagli strains.
(*x*) Extension of fruit culture.
(*xi*) Help in erecting new pumping and crushing plants.

V. V. GADGIL,
Deputy Director of Agriculture,
South Central Division,
Poona.

Poona, 18th August 1936.

APPENDIX E.

Summary of Work done under the Deputy Director of Agriculture, Southern Division, for the year 1935-36.

Staff.

(1) I held charge of the office of the Deputy Director of Agriculture, Southern Division, Dharwar, throughout the year. Rao Saheb G. L. Kottur continued as Cotton Breeder. Mr. K. S. Kulkarni, the Cotton Superintendent, S. M. C., Dharwar, was transferred to the Poona Agricultural College and Mr. V. C. Pavate took charge of this post on 8th March 1936. There were again many changes in the subordinate staff and they had to pick up the work. Mr. B. V. Talegaonkar, Mechanical Assistant, retired and Mr. S. A. Kothavale was appointed in his place.

Season.

(2) The Agricultural season was fairly good in the Division, except in Mallad, where paddy crop was very poor owing to want of rains. Most of the kharif crops were sown in time and germination was good; but there was a long break in July and August which affected these crops to a considerable extent. The situation in the Middle of August became very serious especially in Mallad and Gadinad. Cotton sowing was to be done by this time; but there was no moisture and the cultivators began to fear a very bad year. Fortunately in the last week of August there were heavy rains all over the Division except in Mallad and the cultivators began to regain the hopes. Further rains in October were very valuable to kharif crops and helped the sowing of rabi crops which thrived fairly well. Rice crop suffered most and gave yields ranging only 20 to 60 per cent. normal. Kharif jowar suffered in general from want of rains when young and sugary disease in some places. The yields ranged from 40 to 75 per cent. normal. The cotton crop showed signs of a bumper crop till the end of December but suffered later from unfavourable weather conditions and yields were 60 to 80 per cent. normal. Groundnut suffered from want of rains in July and August and excess of rain at the time of harvest. The yields were only 40 to 60 per cent. normal. Other kharif crops grown on a smaller scale in the Division were also only fair and gave 50 per cent. normal yield. Wheat suffered from rains to a certain extent soon after sowing and gave 60 per cent. normal yield, whereas rabi jowar did fairly well and gave 75 percent normal yield. The season on the whole, therefore, was fairly good except in Mallad. The supply of fodder was not adequate especially in Navalgund and Gadag talukas of the Dharwar District and jowar kadabi shredded and baled at Karjagi in the year 1926 was supplied at a cheap price and it helped the cultivators to a great extent. The economic position of the cultivators has not in any way improved.

(3) The work done during the year is summarised under the same heads as it was done in previous years: (*a*) Research and Experiments, (*b*) Propaganda, (*c*) Organisation, (*d*) Services to the public, (*e*) Agricultural education, and (*f*) General.

(*a*) *Research and Experiments.*

(4) *Dharwar Farm.*—Plant breeding work on cotton which is the main money crop of the Division continued to receive major attention. Jayawant cotton was compared as usual for yield in 6 replicated plots with Kumta, Dharwar No. 2 and Jayawant crosses. Jayawant and Dharwar No. 2 gave significantly higher yields than Kumta. Taking the yields of several years together Jayawant cotton has given slightly higher yields than Kumta. Some promising pure strains of Jayawant × 15 cross were tested in single plots on an area of 3 gunthas, and they are found to be promising. The lint of 4 strains has been sent to the Technological Laboratory, Bombay, for spinning tests.

(5) *New Crosses.*—Six new crosses made with the object of studying the behaviour of wilt resistance in the field and in the Green house were in F_1 generation during the year and two new crosses made with the object of improving the ginning percentage of Jayawant cotton were in F_2 and F_3 generations.

(6) *Behaviour of wilt resistant cottons.*—The incidence of wilt in Dharwar No. 1 cotton in inoculated plots was the same and in uninoculated breeding plots less than that of last year. The progeny of the selections in Farm-Kumta was found to be progressively improving. So far, no individual was absolutely free from mottling, but during this year the progeny of many Farm-Kumta selections showed no mottling whatsoever. All these which were 62 in number were transplanted in the field and they grow well. A large quantity of selfed seed is obtained from these for further testing. The root system of the 62 wilt-free individuals was also examined by isolations and 40 of these showed no trace of fungus. The progeny of these plants will be tested again in the Green house and if they behave in the same way, they will be maintained pure as types mostly immune to cotton wilt. Strains of Kumta-Bailhongal 1-2 and Kumta-Bailhongal 7-6 showed mottling on the cotyledons; but were found to be wilt resistant even under the rigorous tests of the Green house. A few of these are retained for further study. Some fresh selections made at Bailhongal were grown in the Green house, but none of them was as good as Farm-Kumta material and no selection was, therefore, made in any.

(7) *Selfed seed.*—Selfing was done as usual on Jayawant cotton at Dharwar and on Gadag No. 1 cotton at Gadag. 400 lbs. of Jayawant and 500 lbs. of Gadag No. 1 cotton seed have been obtained.

(8) *American cotton work.*—Seven varieties viz. Gadag No. 1, Dharwar-American ordinary, Dharwar-American Neglur 1, Dharwar-American-Neglur 5, Dharwar-American-Neglur 7, Dharwar-American 2-6-5 and Gadag No. 1 × 102 E-4 were tried in replication on Dharwar Farm.

Dharwar-American-Neglur 5 and 7 resisted Red-Leaf-Blight better than others. Dharwar-American 2-6-5 and Gadag No. 1 ×102 E4 were tried at Gadag in single plots against Gadag No. 1 cotton. Gadag No. 1 × 102 E4 gave higher yield than the other two and it was as high as 685 lbs. per acre. These will be tried again. Gadag No. 1 × Co_2 cross which was in the F4 generation had 4 numbers and all these were tested for yield. They gave higher yield than Gadag No. 1 and resisted Red-Leaf disease better.

(9) *Spinning tests.*—Ten cottons were sent to the Director of Technological Laboratory, Bombay, for spinning tests and the following are the results :—

Serial No.	Name of cotton	Staple length by		Height standard warp counts.
		Bolls.	Bars.	
1	Jayawant	0·94	0·94	42
2	Jayawant×15, 11–6–2 ..	0·91	0·88	41
3	Jayawant ×15, 11–12–2 ..	0·94	0·92	40
4	Jayawant ×15, 11–12–5 ..	0·93	0·93	44
5	Jayawant ×15, 15–8–3 ..	0·93	0·90	37
6	Jayawant ×15, 11–0–1 ..	0·98	0·96	43
7	Jayawant × 15, 11–0–11 ..	0·91	0·93	40
8	Jayawant × N 14	0·93	0·94	46
9	Dharwar No. 1 × Dharwar No. 2, 10.	0·97	0·97	44
10	Gadag No. 1	0·81	0·82	32

Jayawant × 15, 11-12-5 and 11-0-1 have done better than Jayawant and these are also more promising in other respects. Jayawant was crossed with N 14 with the object of improving the spinning value and the cross does show improvements.

(10) *Seed tests.*—41 samples of cotton seed received from the District Cotton staff were tested for germination. The percentage of germination varied from 71 to 95. The percentage of impurity was unsually high in some Jayawant samples received from the Hubli centre.

(11) *Jowar.*—The selected strains of Fulgar White, Fulgar Yellow, Bilichigan, Nandyal and Savaner varieties of jowar were maintained and the seed was distributed to the cultivators from Dharwar Farm. The total quantity of seed of improved jowar strains distributed was 4,328 lbs.

(12) *Groundnut.*—Three selections were compared in replications and Spanish peanut improved 5-1 gave the highest yield of 1,608 lbs. per acre. Pondicherry 8 is maintained pure and 436 lbs. was produced for Mundargi Petha.

(13) *Gram.*—Selection for wilt-resistance in local gram was being done for a few years past and two strains were compared during this year with local. Strain No. 18 suffered least from wilt and gave highest yield of 502 lbs. per acre.

(14) *Other crop experiments on Dharwar Farm.*—5 varieties of jowar, viz. Nandyal, Fulgar Yellow, Fulgar White, Bilichigan and Muddinandyal were compared on Fisher's method in 5 replications. Muddinandyal gave the highest yield of grain (1,244 lbs.) whereas, Nandyal gave the highest yield of kadabi (4,424 lbs.) per acre. Muddinandyal, Nandyal and Fulgar White gave significantly higher yields than Fulgar Yellow. Five varieties of cotton viz. Jayawant, Dharwar No. 1, Dharwar No. 2, Dharwar No. 1 × Rosia and Kumta were compared on Fisher's method in 5 replications. Kumta gave the highest yield of 692 lbs. per acre, which is significant over others. 4 varieties of wheat viz. Local, Bansi 808, Bansi 103 and Pusa 3 were compared in 5 replications. Bansi 103 gave the highest yield of grain (458 lbs.) and chaff (808 lbs.) per acre which was significant over local and Pusa 3. Next stood Bansi 808, which gave 430 lbs. grain and 704 lbs. chaff per acre, which was significant over Pusa 3 but not local. Four varieties of tobacco viz. Nadiad 6, Adcock, Nipani and Harrison special were compared on Fisher's method in 5 replications. Adcock gave the highest yield of 516 lbs. leaf per acre, which was significant over all other varieties. Three varieties of gram viz. Local, Burma and strain No. 18 were compared according to Fisher's method in 5 replications. Strain No. 18 gave highest yield—552 lbs. grain and 160 lbs. chaff per acre, which was significant over both local and Burma. Three varieties of castor viz. local, Haveri and Gujarat 5, were compared according to Fisher's method in 5 replications. Local gave the highest yield but the results are not significant. Two varieties of groundnut viz. Selection 5 and the Valentia were compared according to Student's method. Selection 5 is earlier than Valentia, and gave higher yield also 1,674 lbs. pods per acre against 1,426 lbs. of Valentia. The results are significant. Jayawant × 15 was compared with Jayawant Ordinary in 10 replications according to Student's method. Jayawant gave 792 lbs. seed cotton per acre against 743 lbs. of Jayawant × 15. The results are, however, not significant.

(15) *Manurial Experiments.*—In the Farm Yard Manure experiment, 15 tons of Farm yard manure per acre has given higher yields, but 2½ tons per acre every year has given more economic results than others. The yields of cotton continued to increase with the quantity of manure given to jowar crop in the previous year. The results of San green manuring on cotton are not encouraging. Cotton after San green manuring had to be sown late. It did not grow properly and gave poor yields. The green manure also did not rot in time. The application of sulphate of ammonia (14 lbs. N per acre) in addition to 2½ tons of Farm yard manure per acre has given higher yields and higher net profits than Farm yard manure alone. The results are significant. The application of Sulphate of Ammonia (28 lbs. N per acre) to cotton crop gave higher yield than no-artificial manure plot; but the value of extra yield does not cover the extra cost of manure. Bone-meal 112 lbs. and 224 lbs. per acre was compared with no bone meal to jowar and cotton crops in 5 replications with negative results. Residual effects on cotton are not also encouraging.

(16) *Rotational and Cultural experiments.*—In the three-year-rotation experiment, Jowar-cotton-groundnut series has given better results than others. In the two-year rotation experiment, jowar-after groundnut and gram has given better results than others. In the seed-rate experiment on groundnut, 100 lbs. seed rate has given the highest yield. Cotton and groundnut in alternate rows was proved to be more advantageous than cotton and groundnut in blocks. The succeeding crop of jowar in this block also gave higher yield than in groundnut and cotton blocks taken together.

The results of experiments on groundnut with and without a second crop indicate that it is advantageous to take a crop of gram after groundnut and then rotate it with jowar. Unsieved jowar seed gave higher yield than sieved jowar. Length and cross-wise sowing of wheat was again observed to be in no way better than length-wise sowing only. Soya-bean tried in heavy black soil gave better yields (1,020 lbs. grain) than those in light soils (740 lbs. grain) per acre. The application of kerol to potato crop against Sclerotium rolfsii was not effective.

(17) *Garden crops.*—48 mango trees bore fruit during the year. The bearing was shy. The value of produce per acre was Rs. 77 whereas, the cost of cultivation was Rs. 64-8-0 showing a net profit of Rs. 12-8-0 per acre. The number of mango grafts sold during the year was 187 for Rs. 234. The fig trees grown in the plot of 22 gunthas did not do well. Sulphur dustings were given 5 times but rust could not be controlled. Fruits did not develop well, and the yield was only 231 lbs. valuing Rs. 57-12-0 against the cost of cultivation Rs. 249 per acre. It is decided to remove the plantation, as it is causing continuous loss.

(18) *Poultry.*—Poultry on Dharwar Farm has been progressing very satisfactorily, and is attracting the attention of the public. A greater portion of the feeding stuff was continued to be grown on the Farm. The total value of the food was Rs. 325 or Re. 0-2-2 per bird per month. The total sale proceeds during the year amounted to Rs. 593. Leghorn bird produced on an average 175 eggs per year, or 15 per month. Red Rhode Island bird gave 113 eggs per year, or 10 per month.

(19) *Trial of New Seed Drill.*—The Agricultural Engineer's Improved Seed Drill was tried on Dharwar Farm for sowing cotton. As modified, it is now light and practically resembles the country drill, with only a box to hold the grain to be sown. The drill now balances itself very well. An area of 7½ acres cotton was sown with this drill and 4 lbs. was the seed rate per acre. The stand of the crop was very satisfactory.

(20) *Gokak Farm.*—Sugarcane continued to receive major attention on this farm. The average yield of gul per acre for the whole of the farm was 8,181 lbs. against 8,305 lbs. of last year. The area under cane was 11 acres and 2 gunthas against 11 acres and 4 gunthas of last year. The reduction in yield was due to unequal distribution of rainfall and inefficient old machinery which could not stand the requirements of pumping water and crushing cane. The prices of gul were also very low and hence the net profit per acre realised was only Rs. 30 against Rs. 190 of last year.

Grant for the renovation of the old machinery has been sanctioned during the current year. The other paying crops continued to be maize and tur, maize and cotton, cotton and groundnut and Cambodia cotton. The following useful experiments were conducted on the Farm :—

J213 was compared with H. M. 544 in karl soil on Student's method in 10 replications and it gave significantly better yields in confirmation of last year's results. 10 and 20 carts of farm yard manure per acre to J213 gave more profits than 30 carts. 75 lbs. N top-dressing to J213 cane gave better yields and higher profits than 150 lbs. N in confirmation of last year's results. J213 planted 3 feet wide gave more yields than 4 feet. This experiment has been concluded this year in favour of 3 feet from the average data of the past four years. Cambodia (Co. 2) cotton was compared with Gadag No. 1 and Co. 2 gave better yields in confirmation with previous year's results. This trial also has been concluded in favour of Cambodia cotton. Cambodia cotton 3 feet apart with one row of groundnut in the middle gave significantly superior results over Co. 2, 4 feet apart with 2 rows of groundnut in the middle. In confirmation with the result of the last 5 years maize and cotton gave better profits than maize and tur in wilt-affected plots. Selection work in maize for yield and earliness, and that in tur for wilt-resistance continued, and a few promising strains have been found out. Research work on the keeping quality of Mallad gul was taken up during the year under report, and many samples of juice and gul have been analysed.

(21) *Nursery and Orchard.*—The demand for lemon seedlings and Santra, Mosumbi and seedless guava grafts is increasing and the nursery on the Gokak Farm is very successfully meeting it. Banana plantation completed its 7th year. The yield was slightly better than that of last year, and a profit of Rs. 109 was realised against Rs. 90 of last year. The new pomegranate plantation yielded 7,533 fruits per acre. The total per acre income was Rs. 244 and the total per acre expenditure was Rs. 124 giving a per acre net profit of Rs. 120.

(22) *Mugad Rice Breeding Station.*—Four promising strains of Mugad, viz, Early 161, Inter 81 and 249, and late 141, and 3 strains of Antersal viz., Early 67, Inter 90 and Late 200, which yield more than Local, were maintained and multiplied on Mugad Farm. 2,815 lbs. of seed of Mugad stains sufficient for 35 acres, and 1,930 lbs. of Antersal strains sufficient for 25 acres were produced for further multiplication in cultivators' fields. 24 strains of Mugad and 28 strains of Antersal were continued to be kept in reserve. Selection in Dodgya variety of paddy was continued in its 6th year. 7 promising strains were compared for the first time according to Fisher's randomisation. Two checks were used, old local and fresh Belgaum. The yields of all strains, except 11–1–1 were found to be superior to local check, but when compared to Belgaum check, strain No. 6–2–3 alone proved better. The trials will be repeated during the next season. Selections in the new collection of Dodgya were also continued. Out of 13 Indian rices referred to in paragraph 21 of the last year's report, 5 were compared for yield in replication tests with

Mugad 141 and Sannabhatta as checks. Luchai yielded as good as Mugad 141 and is a finer variety. It flowers along with Mugad 141, and thus seems to be very promising. The tests will be repeated during the coming season. Selections in Local fine rices have been continued. The inheritance of grain-shedding in the cross between Mugad 81 and Gonag was studied in F2 generation during the year. The grain-shedding character is found to be dominant, and the analysis of F2 population gives 3 : 1 ratio.

(23) *Kumta Farm.*—Rice breeding continued to be the main work of this farm. The early Jeddu strain 1,061 was compared with Local and Maskaty in three replications and was found to be better yielding. The Early Maskaty strain 1,315 was compared with the Ordinary Maskaty and other local varieties of coastal talukas and was found to be yielding better than all except "Azaga" in one replication which was as good as 1,315. Maskaty 1,315 was compared with Hanasa 154 and there was no difference between the two. Red Halga strain 244 was compared with Local Halga and Mugin-Bendu and was found to be higher yielding. Selection in flood-resistant Kagga paddy was continued and 73 strains were found better than others. The results of the above trials, however, can not be treated statistically as the experiments were not conducted on sufficient number of replications. Jeddu 1,061 and Maskaty 1,315 were crossed with Mugad 161 for yield and earliness and progeny was studied in F1 generation. Selection in Mugin-Bendu variety was continued. 6 up-ghat white Halga strains were compared in 6 replications according to Fisher's method. Strains 1,681 and 1,690 have given increased yields of statistical significance. These strains are slightly finer than local and the kernal colour is whiter than that of the mother variety. A few crosses of Halga 244 with Antersal and Mugad strains have been made during the year to combine high yield and white colour.

(24) *Sugarcane and other crops.*—In the varietal trial, H. M. 544 and H. M. 87 have given better results than others and they are worth pushing out into the District. The manurial experiment on Mango has not given useful results. In the fertilizer experiment on betelnut conducted in a cultivator's field near the farm, bone-meal 4 lbs.+Undi-cake $6\frac{1}{4}$ lbs. has given better results than others. The cultivation of cocoanut as a dry crop on Kumta Farm was continued and the growth of the trees continued to be very satisfactory. A few trees are bearing and yields are being recorded. As regards introduction of new crops, pine-apple, especially kew variety, was found to be very promising and deserves introduction into the District. Extension of its cultivation on Kumta Farm has been planned to provide suckers for distribution in the District. The nursery on the Kumta Farm has been extended, as the demand for mango grafts and pine-apple suckers has considerably increased.

(25) *Gadag Seed Farm.*—This farm was being run with the financial aid of the Indian Central Cotton Committee. Due to want of funds, this farm was closed during the year and the work of selfing and growing the

selfed cotton seed was undertaken in a cultivator's field near Gadag, at his own cost. 500 lbs. of seed has been selfed and 4,787 lbs. seed in the II stage has been raised on this farm during the year. The owner of the field took great pains to do all the work needed and deserves thanks. The cultivation was of high order and the per acre yield of Gadag No. 1 seed cotton was 655 lbs.

(26) *Tegur Cattle Breeding Farm.*—The cross between local cows and Amrit Mahal bull continued to show progress. The performance of the bull was quite good. 14 bull-calves and 7 cow-calves were born during the year and all of them resemble pure Amrit Mahal. Six buffalo bull-calves obtained from Poona College Dairy last year, are thriving well except one and are now fit to be given out as breeding bulls. The total number of the herd on 31st March 1936 was 132 against 144 of last year. 8 bull calves were sold during the year. The bull calves sold in the previous years for draft purpose have attracted attention of the cultivators in Mallad. Results of crossing local sheep with Merino ram have continued to be fairly good. 2 rams have been given out for breeding. These are the mixture of local ewes and Merino ram. Hay and silage were prepared on the farm as usual and jowar and kulthi were grown for the combined object of fodder and grain. Lucern was grown to a certain extent under the new well. Expenditure per head of cattle was Rs. 20 against 19 of last year.

(27) *Experiments in cultivators' fields.*—The District staff continued to conduct experiments in cultivators' fields as usual. With a view to meet the wishes of the cultivators in different places, Jayawant cotton was compared with local Kumta in 53 places all over the Division in different kinds of soils. The average yield of Jayawant cotton from these experiments calculated in lint is higher than that of local Kumta, though the difference is not great. Gadag No. 1 cotton was similarly compared with Dharwar-American in 25 places in Gadag and Ron talukas of Dharwar district. In Gadag taluka, the results were in favour of Gadag No. 1 where—as in Ron Taluka they have considerably varied. Cambodia cotton (Co 2) was compared with Upland under canal and well irrigation in three places in Gokak and Chikodi talukas of the Belgaum District. Co 2 gave on an average 844 lbs. of kapas per acre against 630 lbs. of Upland. Cambodia cotton is gaining ground in the irrigated tract. At Bijapur, Cambodia cotton was tried against N. R. under well irrigation and it gave a yield of 975 lbs. per acre against 1,240 lbs. of N. R. cotton. The trials with selected strains of rabi jowar were conducted at three places. At Bijapur Maldandi strain No. 35-1 was tried against local and it gave an yield of 456 lbs. per acre against 180 lbs. of local. B. D. strain No. 24 was tried at Yergatti in Gokak taluka against the local and the yield was 224 lbs. against 240 lbs. The third experiment was vitiated. Selected strains of paddy were compared with local in all the important paddy growing centres of the Division. The Mugad farm selections gave a uniform increase in yield by about 14·8 per cent. In the North Kanara District, Kumta Farm selections were compared with local at 4 places and they gave increased yields of 10 to 20 per cent.

The trial of Pusa wheat No. 808 was continued in seven places and it yielded more than the local in all cases. There was no rust attack during the year. Pondicherry strain No. 8 was tried at four places against the local. Its average increased yield was 12·4 per cent. over the local. Spanis peanut strain No. 5 gave increased yield in two places out of three over the local. J 213 variety of sugarcane was compared with the local Pundia in three places in Chikodi and Hukeri talukas and it yielded from 10 to 25 per cent. more than the local. Wilt-resistant gram (a strain produced by the Cotton Breeder, S. M. C., Dharwar) was tried in three places with good results. Soya bean was compared with other crops in both kharif and rabi seasons in different kinds of soils and under different conditions of rainfall. It has done well in the kharif season in the Mallad tract, where it has given more than 10 per cent. over kulthi, while in the rabi season it was not successful anywhere.

(b) Propaganda.

(28) *District Cotton Work.*—Multiplication and Distribution of Jayawant and Gadag No. 1 cotton seeds was continued round Hubli, Athani and Gadag. The reserved area under Jayawant cotton in Hubli and Athani centres was 25,377 and 5,848 acres respectively and that under Gadag No. 1 in Gadag centre was 25,259 acres. The roguing expenses ranged from 4·88 to 6·76 pies per acre. The produce of the reserved areas was collected in different centres and sold mostly by auction except in Hubli, where the Society held only one auction sale. It was ginned separately under the supervision of the District staff and seed obtained was 1,982,271 lbs. Jayawant and 1,286,811 lbs. Gadag No. 1 against 1,999,142 lbs. of Jayawant and 1,250,892 lbs. of Gadag No. 1 of last year. The seed has been stocked for distribution during the coming season. A new seed multiplication scheme was submitted to the Indian Central Cotton Committee for covering an area of $7\frac{3}{4}$ lacs acres with Jayawant from seven centres and $1\frac{3}{4}$ lacs acres with Gadag No. 1 cotton from two centres, within the next five years and it has been sanctioned by the Indian Central Cotton Committee and the Government of Bombay. It comes in force from 1st June 1936, but arrangements were made in advance to stock seed required for all the nine centres. The object of this new scheme is to work through all the agencies available and attempt to extend the cultivation of these improved cottons more rapidly than before. The necessary propaganda was done for the same.

(29) *Grading and auction sales.*—The area under pure pedigree seed of Jayawant cotton in Hubli centre was 143,800 acres and that under Gadag No. 1 in Gadag centre was 83,693 acres. The Hubli Cotton Sale Society held only one auction sale in which 3,057 dokras were graded. Gadag Sale Society held 12 auction sales in which 22,444 dokras were graded. Auction sales were held also at Athani, Bailhongal, Dharwar, Annigeri, Haveri, Savanur and Naregal with the aid of Societies and local agents and cotton was graded. This had to be done by the existing staff and it must be stated here that it was done very satisfactorily against many difficulties. The graded cotton fetched better prices than those

prevailing in the market for bazar cotton. Jayawant cotton fetched on an average Rs. 4 more and Gadag No. 1, Rs. 17 more per naga of 1,344 lbs. seed cotton, against Rs. 4 and Rs. 12 respectively last year. Grading and auction sales will be more common with the new scheme.

(30) *Working of the Cotton Transport Act.*—26 check stations were opened during the year against 21 of last year, and the District Agricultural Overseers continued to supervise the working of the same. The new check stations were at Kodihal, Havanur, Chikkurvatti, Mudkavi and Mundagnur. There was a demand for opening 6 check stations throughout the year and the Government have sanctioned the same. Licences were issued as usual from Gadag, Bagalkot and Nargund Offices for import of good cotton from the bordering villages outside the protected areas. The total quantity imported with the help of licences was 14,901 dokras of seed cotton, 6,751 dokras of lint and 6,049 full pressed bales into the Kumta-Dharwar area and 569 dokras of seed cotton and 4,864 dokras of lint into the Bagalkot area. The Cotton Transport Act continued to work well in the interest of the growers as well as consumers of cotton produce in the Southern Division. Illicit import by rail was totally stopped whereas that by road still takes place to a certain extent. Arrangements are being made to improve the efficiency of check stations and their inspection. Rules under the Cotton Transport Act requires some amendments to empower the officers of the Agricultural Department to deal effectively with the illicit import of cotton by road and the matter is under consideration.

(31) *General District work.*—During the year under report, the grant for demonstrations continued to be very limited. The District Agricultural Overseers were instructed to conduct the demonstrations through the Taluka Development Associations and to utilise their limited funds of the Department in places where these Associations do not exist. Demonstrations of successful standing crops of selected strains of cotton, paddy, jowar, groundnut, wheat and sugarcane in experimental plots continued to receive major attention of the District staff all over the Division. 25 demonstrations of paddy strains were conducted and cultivators of 89 villages were invited to attend the same. Village demonstrations on improved strains of cotton were equally intensive. Besides various crop demonstrations sulphur dusting propaganda against smut in jowar and mango hoppers and spraying with Bordeaux mixture against Koleroga on betel-nut were continued to be done on a large scale. The demonstrations of stone-roller and wheat-thresher were mostly limited to Bijapur District where they were needed. Agricultural Engineer's improved seed-drill was demonstrated in cultivators' fields on a larger scale than in the last year round Dharwar and Gadag. Preparation and use of charred bone were demonstrated in 14 centres with useful results. Mr. Hiremath, the Collector of Belgaum, took keen interest in these demonstrations. In all 190 demonstrations of various nature were conducted during the year in the Division and the progress of Departmental work through these village demonstrations continued to be very satisfactory.

(32) Big agricultural and cattle shows held in the Division were 16 in number, 6 in Dharwar District, 4 in Belgaum District and 6 in Bijapur District. A series of lectures was arranged along with the shows on subjects useful to the various tracts with the aid of magic lantern where needed. The Honourable Minister for Agriculture attended the show at Navalgund and the Director of Agriculture attended the show at Kakhandiki.

(33) The Rural Uplift work undertaken at Kakhandiki in the Bijapur District with the aid of the donation given by Mr. Shivappa Arli continued to be satisfactory. 2,696 acres of land were ploughed with iron ploughs against 1,800 of last year and 800 acres were sown with Jayawant cotton against 600 of last year. A well and a farm house were built during the year on the area belonging to this Institution and a plan for planting 600 Mosumbi grafts has been prepared. The area of two acres has been set aside for the Agricultural School building with the aid of the funds collected locally by the villagers and grant of the School Board. The breeding bull maintained by the Institute gave good service and the progress of cattle improvement has been much appreciated by the people of the village.

One hundred and fifty-seven villages have been selected for Rural Uplift work by the Revenue Department in this Division and with the aid of funds from the Government of India. Agricultural improvement is one of the items on which intensive work is being done.

(34) *Propaganda against smut on jowar.*—The work was continued through the District Agricultural Overseers, the Revenue Officers and the Taluka Development Associations. The District Agricultural Overseers continued to hold a number of demonstrations and showed the method of treating jowar seed with sulphur dust against smut. They also did intensive propaganda in some villages and made all cultivators there to treat their seed before sowing. In all 5,440 packets of Sulphur dust sufficient to treat the seed of 87,040 acres were distributed during the year. Propaganda on the use of copper sulphate against smut has been stopped and the Mamlatdars have returned the few packets that were lying here and there.

(35) *Kanarese Agricultural Magazine.*—The propaganda through the Kanarese Agricultural Magazine was continued and many interesting articles were contributed by the officers of the Agricultural Department on different useful subjects. The Deputy Director of Agriculture continued to be the Chairman of the Publication Committee and Mr. S. G. Kadkol, the Superintendent, Dharwar Farm, as Editor of the Magazine. Articles on Village Improvement work also appeared in the Magazine.

(c) *Organisation.*

(36) *Co-operative Sale Societies.*—The Hubli and Gadag Cotton Sale Societies contined to do their work. The Cotton staff of the Agricultural Department worked closely with these Societies for the spread of improved cottons and their sales. It is rather regretting to note that

these Societies are neglecting the quality of their work. The Hubli Sale Society held only one auction sale and sold most of its cotton by private treaty. The part of seed cotton from the reserved area thus sold by private treaty could not be graded and the seed produced thereby could not be certified as pure. It is desirable that these Societies should receive and deal with only improved cottons in the interest of growers as well as consumers. Dharwar, Bailhongal and Bijapur Cotton Sale Societies also continued to do their work, but on a very smaller scale. The sales effected by Gadag Cotton Sale Society during the year came to 26,091 dokras valued at Rs. 8,91,908. The prices realised in auction sales of improved cottons organised by the Sale Societies were always higher than those in the market. Under the New Seed Multiplication Scheme sanctioned by the Indian Central Cotton Committee and the Government, auction sales of improved cottons will be more general and will be encouraged in all cotton growing tracts of the Southern Division. Other sale societies such as Tobacco and Chilly Sale Societies are not showing any marked progress.

(37) *Other Co-operative Societies.*—The Seed, Implement and Manure Societies are not doing any appreciable work. They are going out of existence. Cattle Breeding Societies are realising the benefits derived by crossing country cows with Amrit Mahal bulls but technical management is still lacking. Better guidance is what is needed. Benefits of Co-operative fencing against wild pigs are appreciated by the cultivators, but joint action has continued to be slow to come forth owing to the apathy of the absentee landlords. Legislation to compel the recalcitrant minority has now been passed, by the Bombay Legislative Council and it is hoped that this measure will help the progress of Co-operative fencing.

(38) *Destruction of prickly pear.*—There was very little to be done in this connection. The attack of Cochineal insect has now spread even to unapproachable places and the pear has practically disappeared from most parts of the Southern Division. This is one of the greatest achievement of the Agricultural Department appreciated by the people of the Division from various points of view. In Mundargi Petha of the Dharwar District and in some other places the prickly pear was the home of wild pigs and valuable crops were not safe. Now almost all the prickly pear has disappeared and the pigs have left their homes to live in the interior forest.

(39) *Crop Protection Campaigns.*—The gun-clubs formed for protection of crops against wild pigs thrived well and continued to show good work. The Arwatgi Gun-club continued to be outstanding in its merits and killed 106 pigs during the year. Three new gun-clubs were organised during the year which make up the total of 15. In all 375 pigs were killed and a good many more scared away. The operations of these gun-clubs have saved the cultivators a good deal from night watching, and they are being very much appreciated. The applications for forming more new gun-clubs are coming in and are being attended to. The continuous intensive work all along the Forest borders from Chandgad to Mundgod is likely to help the destruction of wild pigs which is more essential than

mere scaring them away. The campaigns against wild deer were continued at Koujageri and an area of 9,500 acres was protected at an expense of Rs. 106. In all 33 deer were killed and a larger number was scared away.

(40) *Spraying Bordeaux mixture against Koleroga on Betelnut.*—The scheme sanctioned for Siddapur taluka by Government was operated on a more intensive scale than in last year and spraying work was also continued to a certain extent in other talukas of the Kanara District. In Siddapur taluka an area of 1,610 acres was sprayed against 1,003 acres of last year. Tagai loans issued to the cultivators for the purchase of sprayers and chemicals and to meet the wages of expert climbers amounted to Rs. 7,374 against Rs. 4,904 of last year. Series of demonstrations and training classes were continued to be held in different centres and intensive propaganda was made to popularise spraying. The work was organised in 88 villages against 56 villages of last year. Similar work was done in other talukas of the Kanara District also, but on a less intensive scale and an area of 1,546 acres was sprayed specially in Honavar, Sirsi and Yellapur talukas. The total area operated, therefore, was 3,156 acres against 2,678 acres of last year, and 1,441 acres of the year before last. An attempt was made to inspect the crops sprayed and unsprayed in different parts of the District and yields were estimated. The benefits derived by the gardeners from spraying are calculated to amount to Rs. 94,680 at Rs. 30 per acre. During the season the disease caused severe damage and the extra gain due to treatment is Rs. 30 per acre. There were good many difficulties in the way of work and the propaganda was the only weapon available to overcome them. The peculiar season, the indifference of the cultivators and difficulties in the way of getting tagai loans at the right time were the main difficulties, and with all these the progress achieved has been quite satisfactory. The garden cultivators have taken tagai loans in the past for other purposes and are not in a position to get fresh tagai loans for the purpose of spraying. It seems necessary to treat loans for spraying separately as they are annual loans for productive purpose and can be recovered without difficulty soon after harvest.

(41) *Taluka Development Associations.*—There are 15 Taluka Development Associations in the Southern Division—7 in Dharwar, 4 in Belgaum 2 in Bijapur and 2 in Kanara District. According to classification made by the Divisional Board, 8 are in A class, 5 in B class and 2 in C class against 5 in A class and 10 in B class last year. The total amount of subsidy given to these Associations was Rs. 7,484 during the year against Rs. 6,203 of last year. The work of these Associations continue to be good in general. Three have gone from B to A and 2 from B to C class. Many of these Associations did very useful work in connection with the spread of Jayawant and Gadag No. 1 cottons, the use of sulphur dust against smut and extension of fruit cultivation. The financial position of many of these Associations is still unsound and it is getting very difficult to get voluntary subscribers. I must reiterate that the help of the Co-operative Credit Societies is necessary.

(42) *Dharwar District Agricultural Association.*—The main work of this Association was the publication of the Kanarese Agricultural Magazine and thereby to spread agricultural knowledge among the cultivators. The Association started Village Improvement Committees at Dundur, Hulkoti, Saswihalli, Chik-Handigol and Madagnur and worked in co-operation with Taluka Village Improvement Committees that have been newly formed. Saswihalli is doing nice work.

(43) *Wilson Anti-Famine Institute.*—This Institute at Bijapur continued to do good work in various directions. The Depôts sold implements mainly iron ploughs and spare parts worth Rs. 6,000 against those worth Rs. 4,126 last year. The institute distributed 630 bags (88,200 lbs.) Jayawant cotton-seed, 57 bags (13,850 lbs.) Maldandi Jowar-seed, 32 bags (8,000 lbs.) Pivala Kathya Wheat-seed Strain No. 808 and 5,800 fruit-plants. This is, indeed, very, good work. Besides this, tobacco and vegetable seeds worth Rs. 112 and sulphur packets, sufficient for 7,200 acres, were distributed. A Central Poultry Farm and a Nursery have been established. The Rural Up lift work undertaken by the Institute in nine centres, was continued mainly in the direction of (1) Hot-Weather-Ploughing, (2) Cattle-Improvement, (3) Better Storage of Farmyard Manure, (4) Introduction of improved seed, (5) Poultry-Breeding, (6) Sanitation, (7) Education and (8) Social Matters. 281 Improved manure pits have been constructed. The Collector of the District continued to be the President and Mr. A. S. Patil, the District Agricultural Overseer, Bijapur, as Secretary of the Institute.

(44) *Divisional Board.*—The Divisional Board of Agriculture held its quarterly meetings regularly and guided the work of Taluka Development Associations. There was more of routine work than any special subjects discussed during these meetings.

(d) Direct services to the public.

(45) *Field Embankments.*—The special post of Bunding Officer has not yet been restored. One Agricultural Overseer who was spared for the work continued to prepare plans and estimates. In all 51 schemes were prepared during the year for 840 acres against 52 for 600 acres last year. The total estimated cost of these was 17,700 rupees. 28 schemes out of 51 required tagai loans amounting to Rs. 8,220 and the rest were financed by the owners of lands themselves. The demand for services on bunding is far more than what can be met and I reiterate that the special post of the Bunding Officer should be restored. Besides the routine work a Bunding Association has been formed at Marewad to encourage this special work on an intensive scale and demonstrations were arranged in many Village Improvement Committee meetings.

(46) *Work of Mechanical Assistant.*—Mr. B. V. Talegaonkar retired on 14th September 1935 and Mr. S. A. Kothavale was appointed as Mechanical Assistant on 20th January 1936. The post was vacant for

4 months. There were 18 applications for plans and estimates mostly of pumping plants 6 in Dharwar, 10 in Belgaum and 2 in Bijapur District and all of them were dealt with. One pumping plant was erected at Hulikatti. Three repair works were executed. The new Mechanical Assistant had to pick up his work. In addition to the above he attended to the repairs of machinery on the Gokak and Dharwar Farms and organised a demonstration of portable power chaff cutter at Naikanur in Dharwar District.

(47) *Karjagi Fodder Storage.*—All the baled kadabi at Karjagi was disposed of. There was some scarcity of fodder in Navalgund and Gadag talukas and the nine-year old fodder could be made use of. Otherwise the whole stock would have been totally damaged by rain and turned into manure.

(48) *Tractor ploughing.*—The work of tractor ploughing for the removal of hariali (a deep rooted weed) was continued by the Karnatak Agricultural and Transport Company under the auspices of the Burmah Shell and Co. The Agricultural Department continued to help in canvassing the required area and in inspecting the land ploughed. The Revenue Department gave tagai loans to the cultivators and paid the amount direct to the ploughing firm, when the bills were attested by the Inspecting staff and countersigned by the Deputy Director of Agriculture. The depth of ploughing was 12″ and there was no complaint about it. The machinery used was the Mc-Cormick Deering crude oil tractor of the trac-type having 52 H. P. named 40 T. D. and the Rud Sack Deep Tillage three mould board plough. The rate charged was Rs. 18 per acre for 12″ depth. The area ploughed was 418 acres with the aid of tagai loans and 345 acres against cash payment. The average output of work per unit per working day of 22 hours was 8 to 10 acres. It is pleasing to note that the machinery stated above has proved its capacity to deal with the problem of removing hariali satisfactorily in the black soil except in a few cases where it has penetrated more than 12″. The lands tractor-ploughed during past years were inspected and the extent of regrowth of hariali was estimated on an extensive scale. The data obtained are very useful and have been recorded. A botanical study of hariali and its regrowth after tractor-ploughing was planned and carried out during the year by appointing an agricultural Graduate specially for the purpose for 6 months. A study of the growth of hariali and its depth in different kinds of soils indicated that 12″ ploughing is absolutely necessary to effectively deal with it. Another important finding was that clear sun-shine for 15 to 20 days after ploughing was sufficient to kill hariali ploughed out during the season from February to April. Detailed study of moisture and temperature in different kinds of soils and in runners of hariali before and once a week after ploughing have been carefully recorded and conditions under which the hariali dies have been noted. The main type of soil studied in this connection was the deep black cotton soil with the nalla-side karl soils as comparison.

It was found that in ploughed land clods as well as loose soil lose about 50 to 75 per cent. of their moisture in about 20 days after ploughing when

the runners lost their viability and the soil temperature also was higher in the ploughed land than in the unploughed area by about 2 to 3 degrees (Centigrade). During this period the hariali runners also dry up due to exposure and the fall in the moisture content is as severe as from about 29 per cent. at the time of ploughing to about 7·5 per cent. When this condition of low soil moisture and low moisture content in runners is reached, it was found that the hariali runners lost their viability and even optimum conditions of moisture by artificial watering failed to induce their sprouting. The above results were confirmed by laboratory tests wherein a few runners were dried in the sun for different periods and their moisture contents determined and their viability tested after this treatment. As soon as the runners reached the low moisture content indicated by the field observations, they ceased to be viable. These results indicated that it is primarily the drying up of the runners that cause loss of their viability and ploughing to 12 inches depth brings on this condition in black cotton soil in about 15 to 20 days if there be no rains during this period.

(*e*) *Agricultural Education.*

(49) The Vernacular Agricultural School at Devihosur completed its 22nd year. Only 37 applications were received for admission against 80 of last year. The Vernacular Assistant was again sent out for bringing the students and 15 could be admitted. In the 2nd year the number of students was 17. Out of these 32 students, 3 left in the middle. Results of annual examinations continued to be satisfactory. 11 out of 12 in the first year and 16 out of 17 in the 2nd year passed. The number of past students of Devihosur School came to 293. The Association of these past students formed last year held its Annual General Body Meeting at Devihosur and discussed many important subjects. The health of the students continued to be good, and their practical work on the farm was satisfactory. The Social gathering was very successful and 30 past students attended it.

(50) Examinations of all Agricultural Bias classes were continued to be conducted by the District staff of the Agricultural Department. It is desirable that the District Local Boards who run these schools should arrange for the inspection of their schools and relieve the District staff of the Agricultural Department to do more of their own work. A Training school for training the teachers required for these schools continues to be a need.

(51) One important publication issued was a Departmental Bulletin No. 178 of 1935 on "Improvement of Rice in the Bombay Karnatak" part I, by Rao Bahadur S. S. Salimath, Deputy Director of Agriculture, S. D., Dharwar, and Mr. T. R. Khadilkar, Rice Breeder, Mugad Farm. In addition to this, a large number of articles was contributed by the various members for publication in the Times of India, local newspapers and Kanarese Agricultural Magazine.

General.

52. A Revised New Scheme for the extended Seed Multiplication and spread of Jayawant and Gadag No. 1 cottons was submitted and it has been sanctioned by the Indian Central Cotton Committee and the Government. This scheme in brief is to cover $7\frac{3}{4}$ lacs acres with Jayawant from 7 centres and $1\frac{3}{4}$ lacs acres with Gadag No. 1 cotton with 2 centre in five years. Each centre will be under a Graduate Overseer assisted by two or three kamgars. The Indian Central Cotton Committee will meet 75 per cent. and the Government 25 per cent. cost of the scheme. The operation of this New Scheme will commence from next season, but all preliminary arrangements for stocking the seed had to be made during this year, and it meant heavy work to the existing staff. The sanctioned New Scheme, though ambitious, is very hopeful and is expected to bring immense benefits to the cultivators of cotton in the Southern Division.

53. Many schemes for agricultural improvements were submitted to all the four Collectors of the Division, for execution from the District Village Improvement Committee Funds given by the Government of India. The following are the important ones which have been sanctioned and are being worked out.

Dharwar District.

(1) A scheme for the spread of the improved Mugad and Antersal strains of paddy and J 213 cane in the Mallad tract at a cost of Rs. 4,000. Four kamgars have been appointed for four talukas and all the available improved paddy seed from seed-growers has been distributed by Exchange System. J 213 cane sets, two waggon loads were ordered from Gokak Farm.

(2) A scheme for improvement in the supply and quality of farm yard manure at a cost of Rs. 1,000. This is to encourage the cultivators to dig manure-pits and prepare farm yard manure according to the instructions given to them by paying a subsidy of rupee one for each pit. 412 pits have already been built during the year.

Belgaum District.

(3) A scheme for 3 years for the spread of improved Mugad and Antersal and J 213 cane in the Mallad tract at a cost of Rs. 6,760. Two kamgars have been appointed for two talukas, 200 bags of seed were actually purchased from seed-growers and have been distributed on " Vat " i.e. " Loan " system. J 213 cane sets distributed amounted to 4 lacs of sets.

(4) A scheme for 3 years for encouraging Poona-furnaces in Chikodi and Hukeri talukas at a cost of Rs. 720. Two Goundis were trained to do the work and they got 36 furnaces built during the year.

(5) A scheme for 3 years for encouraging field embankments in the dry tract at a cost of Rs. 1,080. A Sub-overseer has been trained to do the work and has got [ ] bunds built in 12 fields during the year.

(6) A scheme for establishing Implement Depôts at a cost of Rs. 2,500. The operations of this scheme will commence during the coming fair season.

(7) A scheme for spraying and dusting potato crop against Jassides at a cost of Rs. 300. The operations will start when the crop is on the field during the coming season.

Karwar District.

(8) A scheme for three years for the spread of improved strains of Jeddu, Maskaty and Halga varieties of paddy, and H. M. 544 sugarcane in North Kanara District at a cost of Rs. 9,100. Five kamgars have been appointed and the work is in progress. These kamgars will also attend to other agricultural improvement works like spraying against Koleroga on betelnut, extension of onion cultivation and popularising artificial manures.

Bijapur District.

(9) A scheme for 3 years for Cattle and Sheep Improvement by establishing a Cattle and Sheep Breeding Farm at Galgali at a cost of Rs. 10,000. The site has been selected and further correspondence is in progress.

(10) A scheme for 3 years for a nursery at Bijapur at a cost of Rs. 3,000. The work has already been started.

(11) A scheme for bunding at a cost of Rs. 1,000. The operations will commence during the coming season.

The preparation of these schemes with all their details and organising the operations of the same, took a good deal of time of the Deputy Director of Agriculture during the year. Very valuable results are expected from these schemes.

54. The 17th Divisional Conference of the officers of the Agricultural Department in the Southern Division was held at Dharwar and the work of the Department was discussed.

55. Besides routine work, the Deputy Director of Agriculture attended the Crop Research Committee meeting in Poona, Railway Board meetings in Bangalore and Madras, Forest Advisory Committee meetings at Dharwar, District Village Improvement Committee meetings at Dharwar, Belgaum, Bijapur and Karwar, Indian Central Cotton Committee meetings and the Provincial Research Council in Bombay. He visited Bailhongal and Bijapur and worked for introducing the Cotton Market Act. He organised training classes for Village Improvement workers in Belgaum and Dharwar District. He drew papers for the Departmental Accounts Examination.

56. The Honourable Minister for Agriculture, Diwan Bahadur S. T. Kambli, B.A., LL.B., J.P., visited the Division three times during the year and toured in different parts where the various activities of the Department were brought to his notice.

Sir T. Vijayaraghavacharya, K.B.E., the Vice President of the Imperial Council of Agricultural Research, visited Dharwar for the second time.

The Director of Agriculture, Dr. W. Burns, D.Sc. (Edin.), toured in the Southern Division and inspected the various activities of the Department. He met cultivators in many places to discuss cotton-seed distribution work.

57. The activities of the Agricultural Department in the Southern Division have considerably extended, especially in the direction of the spread of the improved varieties of cotton, paddy and sugarcane crops and organising gun-clubs against the attack of wild pigs. Eleven special schemes referred to in paragraph (53) have brought much additional work during the year. The clerical staff in the office of the Deputy Director of Agriculture needs much strengthening. All the members of the staff except a very few, continued to do good work. Many Revenue Officers and private gentlemen continued to help our agricultural propaganda and organisation work and many thanks are due to them. My special thanks are due to the Collectors of all the four Districts, who gave me all the help, when required.

S. S. SALIMATH,
Deputy Director of Agriculture,
Southern Division, Dharwar.

Programme of Work under the Deputy Director of Agriculture, S. D., Dharwar, for 1936–37.

(*a*) *Research and Experiments.*

(1) *Cotton Breeding work.*—Selfing of Jayawant and Gadag No. 1 cotton will be continued for multiplication of seed required for 9 centres according to New Scheme sanctioned by the Indian Central Cotton Committee and the Government. Different cottons will be tested for wilt resistance both in the field and in the Green house. Selection in important new crosses will continue.

(2) *Jowar breeding work.*—Fulgar Yellow, Fulgar White, Nandyal, Bilichigan and Savaner selected strains of jowar will be maintained by selfing and grown on Dharwar Farm to meet the needs of the cultivators.

(3) *Groundnut breeding work.*—Spanish peanut variety of groundnut strain No. 5 and Pondicherry variety strain No. 8 will be grown on the Farm to produce seed for distribution in the District. Selection in other promising varieties will be continued.

(4) *General experiments on Dharwar Farm.*—All the important varietal, manurial and rotational experiments will be continued on jowar, cotton, wheat, tobacco and other dry crops. Poultry breeding will be extended.

(5) *General experiments on Gokak Farm.*—Under crop experiments, sugarcane, cotton and tobacco varieties will continue to be compared. Under manurial experiments, different doses of artificial manures on sugarcane will be repeated. Selection in maize and fruit-gardening with its nursery will continue to receive increased attention.

(6) *Rice Breeding work.*—Selected strains of Mugad and Antersal varieties of paddy will continue to be multiplied on Mugad Farm. Selection in Dodgya variety of paddy will receive major attention. Selection in local fine rices will also continue. Botanical study on the cross between gonag and cultivated rice will be persued. On Kumta Farm, selected strains of Jeddu, Maskaty and Red Halga strains will continue to be multiplied. Selection in Upghat white Halga variety and salt land Kagga paddy will be continued. Manurial experiments on paddy, sugarcane and betelnut will be repeated. Different varieties of sugarcane will also be compared. The cultivation of cane and cocoanut as dry crops will continue to receive attention. Pine-Apple cultivation will be extended.

(7) *Experiments in cultivators' fields.*—Selected strains of cotton jowar, paddy, wheat, sugarcane and groundnut will be compared with local in different places of the Division where required. Artificial manures will be tested on sugarcane, paddy and betelnut crops. For manurial experiments on betelnut crop in Kanara District, the post of a kamgar has been sanctioned by Government and intensive work will be done on this item.

(*b*) *Propaganda.*

(8) Demonstrations of improved implements, especially wheat-thresher, stone-roller, groundnut-digger and improved seed-drill and those of successful experiments on Government farms and in cultivator's fields will continue to be held as usual. Spread of Jayawant and Gadag No. 1 cottons will receive greater attention under the new scheme sanctioned by the Indian Central Cotton Committee and Government. Attempts will be made to stop illicit import of inferior cotton into the protected areas of the Southern Division by improving the operations of the Check Stations. Spanish peanut and Pondicherry strains of groundnut will be multiplied and distributed in various parts of the Division. The cultivation of maize with tur and maize with Cambodia cotton will be extended in the Gokak Canal tract. Bunding and Fencing works will receive as much attention as possible with the existing staff. Agricultural shows and conferences will be held where there is keen demand for the same. A Presidency Agricultural Show is under contemplation. Village Officers will continue to receive instructions at the time of Jamabandi meetings and demonstrations. The Rural Uplift work at Kakhandiki and other villages selected by the Revenue Officers will continue to receive due attention.

(*c*) *Organisation.*

(9) Our close work with the Hubli and Gadag Cotton Sale Societies will be continued if they agree to the conditions of the New Scheme. In addition there will be seven centres which will be organised. Crop protection campaigns against deer will be continued and extended in Gadag and Ron talukas of the Dharwar District. More gun-clubs of Arawatgi type for hunting wild pigs will be started.

(10) The existing Taluka Development Associations will be guided to work according to the programmes drawn for them and the new association at Halyal will receive greater attention. The Dharwar District Agricultural Association and Bijapur Anti-famine Institute will continue to receive close guidance.

(11) The work of spraying against Koleroga on betelnut will be extended and further research work sanctioned by Government will be undertaken.

S. S. SALIMATH,
Deputy Director of Agriculture,
Southern Division, Dharwar.

List of Publications with a Summary as per letter No. P. 10, *dated* 17*th April* 1934, *from the Director of Agriculture, B. P., Poona.*

Name of the Author.—Rao Bahadur S. S. Salimath, Deputy Director of Agriculture, Southern Division, Dharwar, and Mr. T. R. Khadilkar, B.Ag., M.Sc., Rice Breeder, Mugad.

Description of the Publication.—Bulletin No. 178 of 1935 on Improvement of Rice in the Bombay Karnatak, Part I.

APPENDIX F.

Summary of work done under the Deputy Director of Agriculture, Gujarat, Surat, for the year 1935-36.

I—Staff.

Mr. C. S. Patel acted as Deputy Director of Agriculture, Gujarat, until 24th June 1936, as I held the charge of the Director of Agriculture, Bombay Presidency, and was subsequently on leave for eight months. He went on leave for a month preparatory to retirement.

Mr. C. S. Patel joined the Agricultural Department in the year 1905 as Graduate Assistant and worked in the various capacities as Superintendent of Farms and District Agricultural Overseer. In 1917 his services were lent to the Agricultural Advisor to the States in Central India at Indore and from there in 1920 he returned to Bombay Agricultural Department as Cotton Superintendent, Surat; he acted as Deputy Director of Agriculture at various places of the Presidency proper and in 1935 he acted as Deputy Director of Agriculture, Gujarat, Surat, from where he retired in July 1936.

2. Mr. M. L. Patel, Cotton Breeder, S. G., Surat, was on leave for six months when Mr. A. K. Shah acted in his place.

3. Messrs. G. P. Pathak and V. M. Majmudar continued to work as Acting Cotton Superintendent, Surat, and Cotton Breeder, N. G., Viramgam, respectively.

II—Season.

4. The monsoon started normally by the third week of June and by the end of the month the sowings were started. On the whole, the rains were much below the average except in Surat District. However it was well distributed throughout the Division. The rice crop was adversely affected. The cotton crop was normal throughout the Division except in Ahmedabad owing to exceptional shortage of rainfall. The tobacco crop fared well. The break of more than a fortnight in August helped the proper cultivation of crops, but severely affected the groundnut crop which was then flowering. The season ended by the middle of September thus the late rains were wanting and the rabi season was poor. Further rabi crops suffered as the winter was mild. The wheat crop suffered from rust in Ahmedabad and the Panch Mahals. Thus the season was fairly good except for rice, groundnuts and the rabi crops.

III—Research and Experimental Work.

(1) Crop Breeding.

Surat.

5. *Cotton—Replication tests.*—B.D. 8 and 1027 A.L.F. were tested in A. B. B. A. method in eight replications. The area of each plot was 1·47 gunthas.

B.D. 8 was superior in yield to 1027 A.L.F., by 7·9 per cent. but the ginning percentage of lint of the former was lower by 3·5 per cent., thus the lint outturn of 1027 A.L.F. was higher by about 2 per cent. than that of B.D. 8. B.D. 8 is also inferior in fibre characters in grader's estimation. The results of spinning tests of 1934-35 indicated that 1027 A.L.F. was suitable for warp 34's against 40's of B.D. 8 even though its staple was shorter. In the Mills it was found suitable for 30's warp counts.

6. *Crosses.*—Selection was continued in all the crosses including the Composite cross of (B.D. 8 × I A.L.B.) × 1027 A.L.F. Back crossing in F_1 crosses has been done with 1027 A.L.F., to get its fibre characters. New crosses have been done to get higher spinning while retaining the fibre characters of 1027 A.L.F. Inter-specific crosses have been successfully made and ten plants are grown.

7. *Selections.*—Two promising selections from gin samples of 1932–33 are retained. The promising selection 16 from local collections of 1932–33 was sent for spinning tests. It was found suitable for 39's. Its staple length was slightly shorter than that of 1027 A.L.F., though longer than B.D. 8. Its fibres were however fine like B.D. 8, i.e. finer than 1027 A.L.F. The yarns of 16 were stronger than 1027 A.L.F., and were free from naps. Further fresh selections have been done from the crop of gin samples of 1934–35.

8. *Seed production.*—Selfed seed 433 lbs. of 1027 A.L.F. and 59¼ lbs. of B.D. 8 was produced, out of which 391 lbs. of the former and 50 lbs. of the latter have been supplied to the Superintendent, Surat Farm, for multiplication.

The special system of dibbling in August failed to give regular germination owing to long drought and also gave poor yield. The system will be modified for dibbling at the first rains.

9. *Vernalization.*—This was repeated with one additional treatment which failed in germination. The treatment III, i.e. soaking the seeds for two days in water and keeping them in dark chamber for ten days, has given higher yield, particularly in the progeny of one selected plant when treated. There was no earliness.

10. *Jowar.*—Selections were maintained pure by selfing. 49½ lbs. of selfed seed was produced out of which 42¼ lbs. has been supplied to the Superintendent, Surat Farm, for multiplication.

Broach.

11. *Cotton.*—This is the fourth season of the cotton work as financed by the Indian Central Cotton Committee.

Crosses.—The crosses of B.D. 8 with Goghari A-26-F_5, with S. 7-1-F_3, with S. 12-1-F_2, with N. S. 12-F_1 and with 1027 A. L. F.-F_1 were grown. Also the back cross of B.D. 8 with (B.D. 8 × Goghari A-26) F_3, and

with (B.D. 8×S. 12-1)-F_1 were grown. The following are maintained after selection :—B.D. 8×G.A-26-F_5. Out of 45 families and the bulk crop, 66 individual plants from 26 families and 3 plants from the bulk crop are kept for further selection. Out of the promising nine, one surpasses B.D. 8 in fibre characters and ginning outturn.

B.D. 8× (B.D. 8×G.A.-26-F_1)—F_3. Out of 29 families, 70 individual plants are maintained. This back cross shows superiority in wilt incidence than the cross itself.

B.D. 8×S. 7-1-F_3 :—This is a promising cross for fibre characters and good combination of other desirable characters. 35 plants are retained.

B.D. 8×S. 12-1-F_2 :—32 plants are retained. The back cross B.D. 8 × (B.D. 8×S. 12-1-F_1) was superior in wilt incidence to the simple cross.

B.D. 8×1027 A.L.F.-F_1.—Unusual amount of heterosis was seen.

B.D. 8×N.S.-12-F_1 Wilt incidence was even less than either of the parents.

The following back crossing was done to give an additional doze of Broach Deshi 8.

(B.D. 8×G.A-26-F_5)×B.D. 8.
(B.D. 8×S.-12-1-F_2)×B.D. 8.
(B.D. 8×N.S.-12) F_1×B.D. 8.
(B.D. 8×1027 A.L.F.) F_1×B.D. 8.
[B.D. 8× (B.D. 8×G.A.-26-F_1)×F3]×B.D. 8.

Also the Composite cross (B.D. 8×N.S-12) F_1×1027 A.L.F., was done.

12. *Selections.*—New selection 12 was again tested in 38 single plant cultures from five families. In wilt incidence 5 had no attack, 25 had up to 10 per cent., 6 had up to 20 per cent. and 2 had up to 25 per cent. This type is almost stable in staple characters. Out of the selections made in last 3 seasons, selection 49 is wilt resistant with other desirable characters.

13. *Seasonal wilt incidence.*—This was noted as in previous years. The wilt was virulent this season and the percentage of deaths is double to that of last season. It was at its height in August.

14. The Pathological work for isolating cent. per cent. resistant type, has been transferred to the Plant Pathologist, Poona, to whom several plants of B.D. 8 and of N.S.-12 showing resistance under controlled conditions have been sent.

15. *Replication trials.*—B.D. 8 and N.S.-12 were tested in four replications of one guntha each. N.S.-12 yielded 6·9 per cent. more than B.D.8 the difference however was not significant. The spinning results of 1934-35 crop gave 27's warp counts for N.S.-12 against 41's of B.D. 8 and 17's of local. N.S.-12 was nearly equal in staple length to local and shorter by 14 per cent. than B.D. 8. In fineness N.S.-12 and B.D. 8 were equal but superior to local by 14 per cent. In grader's valuation B.D. 8 and N.S.-12 were superior to local by Rs. 25, and 5 respectively.

16. *Seed multiplication.*—100 lbs., of selfed seed of B.D. 8 and 900 lbs. of pure seed were produced for multiplication and distribution in Broach tract.

17. *Inter-specific crosses.*—By back crossing reciprocally with both the parents and several other types, one sound seed obtained in 1934–35 was grown this year. This season three seeds have been obtained from the layered plants. Fresh crossed bolls between Hirsutum and Herbaceum have been obtained.

18. *Rabi jowar.*—Selection was continued in Sholapuri and local varieties. The general indications are that there is little scope of getting a type superior to No. 8. The crosses between S. 14×8 and between S. 222×2-A have been done with a view to get desirable combinations.

As the fodder of No. 222, is decidedly inferior, replication tests were not taken. 578 lbs. of seed of No. 8 from the Farm was further multiplied on the Mission Farm at Ankleshwar, from which centre it is distributed in that tract. The natural cross fertilization test is repeated.

19. *Wheat.*—Owing to shortage of rainfall and absence of late rains the crop was severely affected. After selection, 46 cultures of hard white and 29 of hard red are maintained for further selection. The replication trial of Bansi 224 and 168 with local was vitiated owing to uneven germination.

Nadiad.

20. *Tobacco.*—Piliu 28 was tested in five replications by AB. BA. method against local. There was no significant difference, hence the tests are dropped. N–10–3 was similarly tested with Harrison special, the former being late yielded significantly better than the latter.

The economic comparison of G.6 was done with N–10–3 for local use; N–10–3 was nipped at 14 leaves, G.6 yielded 1,476 lbs. against 918 lbs. of the latter; thus N–10–3 is not suitable for local use.

21. *Selections.*—Keliu—Out of 102 grown, 43 are retained for further selection; out of this lot, five are promising and would be under replications. Selections for local use, as well as for cigarettes from the cross White Burley ×P. 45–F_3 are on hand.

The early selection "Early Adcock" and five cultures from G.6× Adcock are keeping up their characters and are continued.

22. The best method of raising seedlings was worked out. Contrary to last year shade did not help, as the rains were favourable. Application of Sulphate of Ammonia is promising. The suitable seed rate per bed 4′×4′ is found to be ¼ tola.

23. *Curing.*—The general economics of Harrison special flue-cured *vs.* G.6, as cigarette tobacco was worked out, the former showed a gain of Rs. 42 after deducting cash expenses of curing. The Harrison special being sold at Re. 0–5–11 and local G.6 at Re. 0–1–6 per lb. Cigarette tobacco was sold to a new merchant whose price is not likely to be repeated

and in future sales will be done to one of the established factories. If however the interest and depreciation on the barn is taken into account and if the supervision charges are considered the net return left is about Rs. 10 per acre.

24. Sun-curing, flue-curing and combined-curing were tested with Harrison special. It is found after analysing for leaf colour and grades, that certain portions are suitable for cigarette while the others only for pipe tobacco.

Flue-curing.—An improved method was devised for securing the yellowing stage either by heaping or hanging the leaf chains in a close damp room, so that the cost of artificial heat would be decreased and there would be also greater turn over per barn. The Pusa method took 61 hours for yellowing in the barn, while the improved method took 16 hours. In both the methods six barns were under test. The following are the results :—

Method.	Number of hours for yellowing in the barn	Total hours for which the barn was occupied.	Cost of curing per lb., in		Turn over per barn of tobacco in		Remarks.
			1934–35	1935–36	1934–35	1935–36	
			Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	
Pusa ..	61	94	..	..	..	..	
Improved ..	16	47	0 2 9	0 2 6	40	72	

The percentage of grades obtained with the prices were as under :—

1st grade	Yellow leaf	.. 33 per cent.	.. 9 annas per lb.
2nd grade	Red leaf	.. 30 per cent.	.. 6 annas per lb.
3rd grade	Greenish leaf	.. 13 per cent.	.. 5 annas per lb.
4th grade	Torn spoiled leaf	.. 24 per cent.	.. 3 annas per lb.
	Average		.. $5\frac{3}{4}$

The prices obtained for grades 3 and 4 are very good and it is doubtful if the Bombay Cigarette factories will offer such prices.

25. *Bajri—Replications.*—Out of the four types tested Nos. 128 and 207 are tested since last 3 seasons while the other two 66 and 206 were not tested last year. The results are comparable in four replications, the area of each plot was one guntha. Types 207 and 206 are significantly superior to the local. The former is superior by 12 per cent. and the latter by 10 per cent. 207 is better as in previous years. It is capable of further improvement as it shows splitting in red pigmentation. 66 has yielded lower than local ; while 128 is slightly better. However trials need to be taken on more even land to make them reliable.

In fodder yield 206 and 207 are equal to that of local. In quality, the grain and fodder of 206 are better; while No. 207 is equal to local. 35 types were grown for further purity and selection.

26. *Castor.*—Besides the two types *viz.*, 20 and 5, selfed heads of No. 9 were grown from Jalgaon Farm for further selection on the observed correlation of high percentage of females with yield. No. 9 showed considerable splitting. No. 20 was pure for green sheath and double bloom; while No. 5 was slightly splitting. Selection for high yield i.e., for high percentage of female flowers is done in each of the three cultures. One selection from No. 20 which is promising for yield and high percentage of female flowers is unusually early. It will be tested in replications.

Selection from heads continuously selfed for some years and selfed this season from the open fertilized crop of last year is being continued.

Viramgam (Ahmedabad District).

27. *Cotton—Replication tests.*—Two cultures of the cross viz. 4–1 and 7–1 pure tested with local Wagad and Wagad 8 in five replications. Each plot being 1·93 gunthas.

7–1 is a wide opening type and is tried for the first time. It is also later than 4–1. In yield of seed-cotton 7–1 and Wagad 8 yielded the best. Local yielded significantly lower than all the rest and between the remaining, there was no significant difference. Yields during the year were low due to deficient rains. Quality of cotton too has deteriorated. In yield of lint 7–1 is significantly superior to all; as it is superior in ginning per cent. by 5 per cent. to Wagad 8. 4–1 and Wagad 8 are also significantly superior to local.

The cultures 4–1 and 7–1 have proved inferior in staple to local this season by 8 and 3·5 per cent. respectively. The former is valued lower than local by Rs. 20. Though 4–1 and 7–1 are superior to Wagad 8 and local by 2's and 6's counts respectively on account of fineness of fibres. 4–1 is rapidly falling in spinning value. High ginners are suspected of such falls in bad seasons and are unsuitable for market being unsteady; 7–1 is also a high ginner. The test will be continued. Fresh selections from the local material have been made to get a strain superior in quality to 4–1.

28. *Jowar.*—Two selections from Chhasatio and two from Utavli were tested with their respective locals in five random replications, each plot being 0·8 guntha.

The local Chhasatio was significantly superior to both the selections in grain. In fodder there was no significant difference though C-8 was superior to local; while 10–2 was inferior. The grains of both were smaller. The sugar content in fodder is less in both particularly in 10–2. In Utavli 11–4 is superior both in grain and fodder to local; while 3–4 was inferior in both, however none of the differences is significant. The sugar content of 11-4 is very high. It is however late. The experiment will be repeated.

29. The Cotton Technological Assistant is maintained from the funds of the Indian Central Cotton Committee. He helped the Breeders at Viramgam, Broach and Surat, examining 500, 1,265 and 620 samples respectively. 109 samples were examined for fibre length, fibre weight and maturity. 9 samples were also tested for fibre strength.

(2) Experimental Station Work.

(a) *Surat Agricultural Station.*

30. *Seed multiplication.*—Cotton 1027 A.L.F., was grown on 62 acres and 29 gunthas giving on an average of 677 lbs. seed cotton per acre. 23,698 lbs. of resultant seed was distributed in the selected villages of seed groups in the district for further multiplication and distribution.

31. Jowar Budh Perio 53 was grown on 52 acres and 14½ gunthas giving 1,128 lbs. (1,100 lbs., jowar *plus* 28 lbs., Tur) of grain on an average per acre. 15,006 lbs., of seed was distributed in the district through the Cotton Superintendent, Surat, and 3,034 lbs. in States and other places directly from the farm.

32. *High* vs. *Low ridges.*—The experiment was carried out as described in paragraph 30 of last year's report. There was practically no difference in germination. The percentage increase in yield over the control (i.e., ordinary flat) is as under :—

Treatments.	Percentage increase over control.
(1) Flat with shovel	1·82
(2) Low ridges	3·99
(3) High ridges	9·53
(4) High ridges with disc.	11·03

High ridges under Nos. 3 and 4 treatments are significant over control (of flat with harrow only) and No. 1 (flat with shovel).

High ridges with disc treatment is also significant over low ridges.

33. *Manurial Experiment.*—Sulphate of ammonia—The experiment reported last year in paragraph 31 was carried out. The percentage increase or decrease in yield over the control (i.e., no manure) is as under :—

Treatments.	Percentage increase or decrease over control.
(1) 40 lbs. N. after stand	57·97
(2) 40 lbs. N. at sowing	48·61
(3) 20 lbs. N. after stand	37·39
(4) 10 lbs. N. after stand	24·30
(5) 10000 lbs. Farm Yard manure once in six years	20·26
(6) 20 lbs. N. at sowing	17·90
(7) 10 lbs. N. at sowing	16·80

(A) 40 lbs. N. after stand and 40 lbs. N. at sowing are significant over—

(1) No manure.
(2) Farm yard manure.
(3) 20 lbs. N. at sowing.
(4) 10 lbs. N. at sowing and
(5) 10 lbs. N. after stand.

40 lbs. N. after stand is just significant over 20 lbs. N. after stand also.

(B) 20 lbs. N. after stand is just significant over no manure only.

40 lbs. N. after stand is significant over general mean also.

40 lbs. N. at sowing is just significant over general mean.

N.B.—During the season however there was very little rain after August and as a result the manure applied after stand is perhaps not utilized fully as judged from past experience and the higher yields are perhaps not due to treatment but perhaps due to lower yields of other treatments where the treatment being early gave very good vegetative growth of crop at the start and for want of late rains at bearing time the crop showed reduced bearing and yellowing of leaves thereby giving less yield; so the results are probably vitiated.

Yield results are as under :—

Treatments.	Yield in lbs. per acre.	Per cent. increase or decrease over no manure.	Extra cost of manuring over no manure.	Value of extra yield over no manure.
			Rs. a. p.	Rs. a. p.
(1) No manure (control) ..	435·84	..	....	....
(2) 10,000 lbs. Farmyard manure once in six years ..	524·15	20·26	....	9 10 4
(3) 40 lbs N. in the form of Sulphate of ammonia at sowing	647·72	48·61	14 9 3	23 2 8
(4) 20 lbs. N. in the form of Sulphate of ammonia at sowing	514·05	17·90	8 8 3	8 8 9
(5) 10 lbs. N. in the form of Sulphate of ammonia at sowing	509·10	16·80	5 7 7	7 14 8
(6) 40 lbs. N. in the form of Sulphate of ammonia after stand	688·51	57·97	14 4 3	27 0 0
(7) 20 lbs. N. in the form of Sulphate of ammonia after stand	598·81	37·39	8 3 3	17 13 1
(8) 10 lbs. in the form of Sulphate of ammonia after stand ..	541·78	24·30	5 2 7	10 10 2

The residual effects of manurial treatments to cotton on next jowar crop.—40 lbs. N. after stand is significant over no manure for grain and significant over all treatments and general mean for fodder. This shows that N. applied last year after stand was not fully utilized by the cotton crop as there was practically very little rainfall in the months of August and September.

34. *Spacing Experiment.*—The experiment reported last year in paragraph 32 was continued and the results are as under :—

Treatments.	Yield in lbs. per acre	
	Dibbling.	Drilling.
3′ × 3′	524·51	582·03
4′ × 2′	586·22	617·08
4′ × 3′	531·13	546·55
5′ × 2′	617·08	612·89
6′ × 2′	623·69	612·67

None of the treatments when compared among themselves is significant from point of yield, however 6′ × 2′ dibbling and drilling, 5′ × 2′ dibbling and drilling and 4′ × 2′ drilling are more or less alike.

35. *Residual effects of wider spacing of cotton on next jowar crop.*—

Grain.—Dibble 4′ × 2′, Dibble 5′ × 2′, Dibble 6′ × 2′, Drill 3′ × 3′ and Drill 4′ × 3′ are significant over Drill 6′ × 2′.

Fodder.—Dibble 5′ × 2′ and Dibble 6′ × 2′ are significant over Drill 6′ × 2′.

36. *Cotton green manuring experiment.*—The experiment reported last year in paragraph 35 was continued.

Dhaincha plants were buried in the soil when they were 1¼ months old. Their weight was as under :—

	Green stuff per acre in lbs.
With manure	8,639·40
Without manure	7,477·00

The yield results are as under :—

Treatments.	Yield of seed cotton per acre in lbs.	Percentage increase over control.
1. Cotton (control)	554·62	....
2. Cotton with Farm yard manure	584·03	5·30
3. Cotton with Farm yard manure plus Dhaincha ..	657·98	18·63
4. Cotton with Dhaincha	684·87	23·48

No. 3 Cotton with Farm yard manure plus Dhaincha and No. 4 cotton with Dhaincha are significant over No. 1 control and No. 2 cotton with Farm yard manure.

37. *Residual effects of green manuring in cotton on next jowar crop* :—

Grain.—No. 3 Farm yard manure plus Dhaincha and No. 4 Dhaincha alone are significant over No. 1 control and No. 2 with Farm yard manure.

Farm yard manure plus Dhaincha is significant over general mean also.

Fodder.—Farm Yard Manure + Dhaincha is significant over No. 1 control and No. 2 Farm Yard Manure.

38. *Green manuring experiment for jowar*.—The experiment reported last year in paragraph 36 was carried out. Dhaincha plants were buried in the soil when they were 1¼ months old. Their weight was as under :—

	Green stuff per acre in lbs.
With manure (4)	24,611
Without manure (3)	21,340

Due to peculiarity of the season Nialo jowar (Semi rabi variety) had to be sown in treatments 3 and 4 after burying Dhaincha ; as Budh Perio 53 jowar could not be grown in time whilst treatments 1 and 2 were sown with Budh Perio 53 at usual time. The yield results are as under :—

Treatments.	Yield of grain in lbs. per acre.	Per cent. increase or decrease over control.	Yield of fodder per acre in lbs.	Per cent. increase or decrease over control.
(1) Jowar (Control) Budh Perio 53	1,154·42	....	1,785·71	....
(2) Jowar (Budh Perio 53) Farm Yard Manure ..	1,195·29	3·55	1,785·71	0·00
(3) Jowar (Nialo) after Dhaincha	880·67	—23·71	1,617·65	—9·41
(4) Jowar (Nialo) Farm Yard Manure after Dhaincha ..	956·30	—17·16	1,826·88	2·30

Grain.—Jowar + Farm Yard Manure is significant over Farm Yard Manure + Dhaincha and Dhaincha alone. Jowar (Control) is significant over Jowar + Dhaincha. But considering a large quantity of green manure being added to the soil — loss is not much.

Fodder.—None of the treatments is significant.

39. *Residual effects of green manuring for jowar on next cotton crop :—*

Treatments.	Yield of seed-cotton in lbs. per acre.	Per cent. increase or decrease over control.
1. Control	611·43	....
2. Farm Yard Manure	620·84	1·53
3. Farm Yard Manure + Dhaincha (34,717 lbs. of green matter buried)	855·12	39·85
4. Dhaincha (29,881 lbs. of green matter buried) ..	729·07	19·24

No. 3 Farm yard manure plus Dhaincha and No. 4 Dhaincha are significant over No. 1 control and No. 2 Farm yard manure. Farm yard manure and Dhaincha is also significant over Dhaincha alone and also over general mean.

40. *Rotational experiment.*—This is a new experiment and was started last year. The last year's results were not comparable it being first year. There are eight treatments randomised into five replications. They are as under :—

(A) Green manure with Dhaincha (Fallow).
(B) Cotton after green manure (Fallow).
(C) Jowar after cotton.
(D) Cotton after jowar.
(E) Jowar after cotton.
(F) Cotton after jowar.
(G) Cotton after jowar } No green manuring at all (Control).
(H) Jowar after cotton }

Thus in a cycle of six years, each plot except those having the treatments G and H will receive green manure once in six years. The object is to compare the yields of cotton and jowar with no green manure in the rotation. Farm yard manure at the rate of 10 cart-loads per acre was given in 1933–34 to the whole series. It will be given again in future after six years to the control plots only, viz. G and H at the rate of 3 cart-loads to every cotton crop i.e. in alternate years. The green manure plot remains fallow for the whole year. The net area of each plot is 2·95 gunthas. The average green stuff buried per acre was 35,937 lbs. in 1934–35 and 41,527 lbs. in 1935–36 when the average height of plants was 62·6 and 72·4 inches respectively. The crop was buried in the soil after two months in the last week of August in 1934–35 and in the last week of September in 1935–36 when it was 2½ months old. It was a regular experiment laid out in 1934–35, but it being the first year no treatments were comparable and hence the yield results not given in that year's report.

The yield results for 1935–36 are as under :—

Treatments.	Yield per acre in lbs.	Per cent. increase or decrease over control.
A. Green manure (Fallow)	....	....
B. Cotton after green manuring	1,326·83	115·19
D. Cotton after jowar	609·17	—1·36
F. Cotton after jowar	600·97	—2·46
G. Cotton after jowar (no green manure)	616·58	....

Even in the second year jowar results are not comparable and hence not given.

41. *Surat Dairy.*—The strength of the herd on 1st April 1936 was 90 as against 109 of last year. The health of the herd remained on the whole good. There was a mild attack of foot and mouth disease during the year—one old bull was given out free of charge for breeding purposes and 2 bulls were given in exchange from the Surat lot. The demand for Premium bulls is getting less due to price being raised from Rs. 50 to Rs. 100. The milk production and realization from the sale of Dairy produce during the year 1934–35 and 1935–36 were as under :—

Year.	Total milk in lbs.	Average No. of adult cows for the year.	Annual average per cow in lbs.	Total realization in	Average rate in lbs. per rupee.
				Rs.	
1934–35 ..	93,045·4	33·4	2,785	6,976	13·33
1935–36 ..	87,775·0	35·5	2,472	6,066	14·47

(*b*) *Broach Farm.*

42. *Manurial experiments.*—The following three treatments have been given to the cotton crop since last four years and compared with no manure treatment :—

(1) 4 cart-loads of Farm yard manure per acre.
(2) Sann sown and buried in the middle one foot strip.
(3) Besides treatment No. 2, 10 lbs. of N. in the form of Sulphate of ammonia given at the time of sowing at a distance 6″ on either side of cotton rows.

Residual effects of these treatments on the rotational crop of jowar have also been studied since last three years. The results for the year 1935–36 are as under :—

Crop.	Yield per acre in lbs. Treatments. 1	2	3	Control.
Kapas	432*	378	362	364
Grains (jowar)	1,294*	1,134	1,152	1,036
Fodder	1,802*	1,762*	1,686*	1,540

*Significantly superior to control. The treatment No. 1, viz. Farm Yard Manure, is significantly superior to the control in cotton. Similarly it is significantly superior both in grains and fodder to the control in residual effect also. Treatment No. 2 and 3 are significantly superior to control in fodder only when residual effect is considered. It may be noted however that kapas yield under treatment 3 where Sulphate of ammonia was given is poor only during this year due to less moisture. When direct and residual effect are taken into consideration for all the years there does not seem to be any better substitute than Farm Yard Manure (treatment No. 1). The amount of green matter buried is however too small to give any result.

43. *Effect of groundnut and jowar rotation on cotton.*—The increase in the yield of seed cotton due to groundnut rotation comes to 67 per cent. against that of jowar rotation. The crop under groundnut rotation was early by about a fortnight.

44. *Dhaincha green manuring versus no manuring to rabi jowar.*—Dhaincha sown on 27th June and buried on 1st August gave 12,709 lbs. green matter per acre. A subsequent rabi jowar crop has given 20 and 3 per cent. higher yield of grains and fodder respectively against no manuring. Residual effect on next crop of cotton will be watched.

45. *Trials of Spanish peanuts.*—The yield per acre has been 1,338 lbs., of pods this year when compared with 732 lbs., of last year and 471 lbs., in the year previous to it.

(*c*) *Dohad Farm.*

46. The seed supplied from the farm was as under :—

Maize	2,806	lbs.
Spanish peanut	809	,,
Pusa 4 wheat	10,380	,,
Yellow gram	2,211·8	oz.
Jirasal paddy	584	lbs.
Anklo paddy	24·8	oz.

The seed-drill training class was attended by about 60 to 70 Bhil cultivators.

IV.—Propaganda.

Ahmedabad District.

47. *Trials in cultivators' fields.*—Cotton segregate 4-1 and open boll type segregate 7-1 and 11-2 were tried at several places but the results are not comparable due to failure of rains. The trial of segregate 11-2 will be dropped as it did not do well when compared with 7-1 under irrigation.

48. *Seed multiplication.*—The extension of Wagad 8 has been stopped departmentally though the registered seed growers at Mandal and Bhawanpur of last year have produced sufficient seeds for distribution amongst themselves.

Banilla cotton.—It had an area of 1,600 acres. Under dry conditions it yielded 4 to 8 per cent. more than local and under irrigation gave 17 to 28 per cent. higher yield.

49. Wheat No. 224 has extended in the Bhal tract to the extent of 5,000 acres as against 4,200 of last year. No. 808 was compared with Wagia, Dhola-katha and Chandushi and yielded more by 97 per cent., 37 per cent. and 130 per cent. respectively as the latter varieties were attacked by rust. Pusa 52 has done best everywhere in the District. It is an irrigated type and rust resisting.

50. Sugarcane No. 213 is slowly increasing in area. P. O. J. 2878 has also been introduced this year on an area of 2½ acres and the crop will be utilized for increasing the area instead of crushing this season.

51. *Manurial.*—Application of 10 lbs. N. in the form of Sulphate of ammonia was tried on groundnut, cotton and wheat but they were not successful due to scanty rains.

52. *Cultural.*—20″ *versus* 27″ drill was used for cotton in four trials and an increase of 4 to 28 per cent. yield was recorded. In case of dibbling *versus* drilling 6 to 20 per cent. increase was observed.

53. *Demonstrations and shows.*—In all 69 shows were held for demonstrating the working of ploughs, silo-making, improved furnace and gul-making etc., of these two shows viz., at Chharodi farm and Viramgam were financed by the Collector from Village Up-lift Funds.

54. *Implements.*—Implements worth Rs. 2,900 were introduced in the District. These consisted of 75 Cooper ploughs, 3 Bahadur ploughs, 2 Kirloskar ploughs, 6 McCormic cultivators, 2 Persian wheels, 4 Spray pumps, 2 bullock power and one power cane crusher, etc.

55. *Seed distribution.*—Seeds and plants worth Rs. 1,616 were supplied in the District. These mainly consisted of Sann seeds 22,380 lbs., wheat strain No. 224 1,030 lbs., Pusa 52 1,200 lbs., Nos. 808 and 168—300 lbs., Magdi and Spanish peanuts 700 lbs., 9,200 lbs., Pomegranate and Guava seedlings, 1,000. Grape cuttings 1,030, Mosambi grafts 2,550, Basarai Banana suckers and Mango grafts, etc.

56. *Rural Up-lift.*—The Collector has given a substantial grant from the V. U. L. funds towards the introduction of improved ploughs,

supply of improved wheat seeds, filling the siloes and feeding same, etc. A Kamgar has also been appointed at Ghogha for the purpose and a subsidy of Rs. 300 has been given to the Taluka Development Association, South Daskroi. Rs. 1,400 have also been provided for supply of Breeding Bulls in the District and the progress is mainly due to the funds thus made available.

Panch Mahals District.

57. *Trials in cultivators, fields—Cultural trials.*—Broad sowing *versus* Narrow sowing. Wider sowing in maize gave an increase of 8 per cent. on an average of four plots. Maize sown 15″ apart yielded 1,341 lbs. as against 1,242 lbs., when sown 9″ apart with a local plough.

58. *Manurial trials.*—Application of Sulphate of ammonia 112 lbs. per acre was tried on Sutarsal and Jirasal rice. The former gave an increase of 46 per cent. and the latter 30 per cent. over untreated plots.

A top-dressing of 50 lbs. N. in the form of Sulphate of ammonia was tried on sugarcane in six plots. The treated plots gave an increase of 27 per cent. cane as against untreated ones.

59. *Varietal trials.*—

(*a*) Paddy strain K 540 was tried in comparison with local Sutarsal but it yielded less for the fact that it was late by about a fortnight, and the rains were deficient.

(*b*) Three plots were laid out to compare Spanish peanut with Small Japan. The former yielded 1,005 lbs. per acre as against 925 lbs. of Small Japan.

(*c*) Rabi jowar No. 8 was tried with local in seven plots. The strain on an average yielded 596 lbs., when compared with 458 lbs. of local per acre.

60. *Sugarcane.*—The area under CO. 213 reached 2,000 acres against 1,500 of last year but now it seems less prospective on account of low rates of gul and high prices of groundnut. P.O.J. variety has been grown also on an area of about 20 acres in Kalol Taluka. Now the double furnace has been in general use and 6 multiple furnaces were constructed to cope up with power crushes and to economise fuel consumption. Application of Sulphate of ammonia as a top-dressing and the planting of cane 3′ apart is being recommended.

61. *Distribution of seeds, manures and implements* :—

Wheat Pusa 4	11,110	lbs.
Gram	19,580	,,
Spanish peanut	1,120	,,
Paddy	800	,,
Sann seeds	4,460	,,
Sulphate of ammonia	21	tons.
Groundnut cake	400	maunds.
Bullock cane crushers	100	
Power crushers	6	
Oil Engines 13 B.H.P.	2	
Boiling pans	125	

62. *Demonstrations.*—In all 15 demonstrations on crops, working of implements, and improved furnaces were held. Besides six meetings of cultivators were organised in all Talukas and the advantages of improved farming were explained.

Kaira District.

63. *Trials in cultivators' fields—Cultural.*—Wider sowing 15" and 18" apart against 12" local for bajri, kodra, bavto was carried out by 32 cultivators to an extent of 340 bighas against 110 bighas of last year.

Manurial.—Application of Sulphate of ammonia at the rate of 56 lbs. per acre to kodra, bavto, bajri and paddy three weeks after sowing was given. Except bajri which was late sown all other crops have given an increased yield varying from 10 to 30 per cent.

Varietal.—Pusa 4 and strain No. 224 wheat are being grown by cultivators, the former for its rust resistance and the latter as a dry crop in Matar Taluka.

64. *Distribution of seeds, manure, implements, etc.:—*

Wheat Pusa 4	..	1,200 lbs	Mosambi grafts.	..	1,925
Strain No. 224	..	6,920 „	Mango grafts	..	507
Broach Cotton special	..	..	Banana suckers	..	19,500
Cotton seeds	..	15,000 „	Chikoo grafts	..	83
Sann seeds	..	3,080 „	Guava plants	..	1,000
P.O.J. 2878	..	40,000 canes.	Others	..	288
Iron cane crushers	..	76	Denatured salt	..	32,280 lbs.
Poona gul-boiling pans	..	60	Bone meal	..	12,400 „
Ridgers	..	4	Light iron plows	..	26
Centrifugals for sugar making	..	3	Levellers	..	2
			Chaff-cutter	..	1
			Plant-pullers	..	253

65. *Sulphur dusting against jiru mildew.*—This was carried out in 37 villages by 226 cultivators on 538 bighas when compared with 125 vighas in 10 villages during last year. Besides 62 mango trees were dusted against hoppers.

66. *Sugarcane.*—The area has gone up to 800 acres. The chief type is CO. 213 and a few acres of P.O.J. 2878. The cultivators were advised for gul making on improved method and the actual process was demonstrated by engaging 3 gulvas who worked in all for 139 days at 12 places and 39 cultivators took advantage of this opportunity.

67. *Horticultural propaganda.*—Improvement of country mango trees by khunti grafting was undertaken and 416 trees were thus grafted at 14 places. Besides budding of country bor trees, pruning of grape vines, spraying of mosambi and lemon trees, etc., were done at several places and the Sub-Overseer visited 45 fruit gardens giving necessary help and advice for their proper working.

68. *Treatment against jowar-smut.*—4,600 packets of Sulphur were supplied through the Agricultural Associations with the help of Revenue Officers.

69. *Agricultural organisation.*—Several meetings were held for doing propaganda work and enlisting new members in the existing Agricultura Associations and steps are being taken to register two Associations of Matar and Kapadvanj.

70. *Improvement of cattle.*—One cow bull and 4 buffalo bulls were supplied at Traj, Lambhwel, Vadod and Khambholaj during the year.

Broach District

71. *Trials in cultivators' fields.—Jowar strain No. 8.*—An area of 50 acres was grown by cultivators at Tralsa which is one of the Village Up-lift centres in the District and these growers have distributed the resultant seed to other cultivators in round about villages. Similarly it is extending round about Amod where its area was found to be 30 acres. A fresh stock of 480 lbs. has been issued to Buva Amod and Sarbhon villages.

72. *Wheat 224.*—The seed was produced in bulk at Pakhajan but the whole of it could not be returned for sowing in absence of a financing agency. However 12,920 lbs. of seed was available for growing it on an area of 304 acres in Pakhajan, Atali, Akhod, Dahej, Limbdi, etc., villages. A fresh stock of strains Nos. 224, 168 and 808 was received from the Crop Botanist and these were tried at five places. No. 224 was found to ripen earlier than Local by about 10 days and No. 168 and 808 were earlier by about a fortnight but the latter two are poor in tillering and excellent in quality. The season was not favourable for wheat and no definite conclusions can be drawn from this year's yield figures.

73. *Groundnut.*—In spite of demonstrating the economic and rotational value of this crop in the past it is not taken up systematically by the people. Six plots of Spanish peanut were laid out at two villages viz., Simalia and Bori. The average yield per acre was 400 and 760 lbs., respectively.

74. *Demonstrations.*—Eight large and many small demonstrations were held to show the superiority of B. D. 8 cotton, wheat No. 224, effect of sann green manuring, Sulphur dusting, spraying etc. Five magic lantern lectures were given to explain the different items of agricultural improvements in the District.

75. *Manures.*—8,160 lbs., of Sulphate of ammonia was used on cotton and garden crops. 30,440 lbs., of sann seeds were supplied for green manuring. 27,200 lbs., Castor-cake powder and country ghani cakes about 60,000 lbs., were disposed off for manuring cotton, garden crops and fruit trees.

76. *Control of jowar-smut.*—2,250 sulphur packets were supplied for treating jowar seed before sowing. The Assistant Collector has arranged to distribute 6,000 packets through his Assistants in the next season and this method is bound to succeed.

77. *Cochineal insects.*—These were introduced only last year and there is not a single village now in the District where the insects have not spread on the cactus and village surroundings are getting cleaned up.

78. *Cotton Boll-worm control in Broach District—North of the river Narmada.*—The work was started in the month of February with one graduate Assistant and 19 Kamgars (paid by the Indian Central Cotton Committee) and working under the guidance of the District Agricultural Overseer, Broach. As is usually the case the Farmers were shy to declare their needs in good time. Wooden handle pullers were kept ready in sufficient stock but the iron handle pullers fell short as the factory did not fulfil the supply according to indents in time. The work in Jambusar Taluka was set back owing to dearth of iron handle pullers at the right time when the cleaning of fields was in full swing. In all 2,286 pullers were supplied in the District as under :—

Taluka or tract.	Iron handle pullers.	Wooden handle pullers.	Total.	Remarks.
Jambusar ..	546	223	769	385 were sent to Surat and not included here.
Rest of Broach District North of Narmada .	205	1,312	1,517	
Total ..	751	1,535	2,286	

It will be seen from above that a beginning is made in Jambusar this year with 769 pullers.

Cleaning of stalks.—The following table gives an idea as to the area cleaned etc., by the end of May 31st when the scheme was closed :—

Taluka.	Total area cleaned by 31st May.		Area up-rooted by plant-puller and Kudali.	Area hacked by Kudali.
	Area in acres.	Per cent.		
Broach ..	73,636	99·1	Whole Includes 10 per cent.	*Nil.*
Amod ..	43,415	97·1	Do. Kudali up-rooting.	,,
Vagra ..	43,313	99·1	Do.	,,
Jambusar ..	92,766	98·6	22,186 Plus 90 Kudali.	70,490

In Jambusar Taluka 5,777 acres were up-rooted by plant-pullers. last year but the area thus cleaned is nearly four-fold during the current year. The area remaining uncleaned (1 to 2 per cent.) belonged to absentee land-lords and it is not possible to improve the situation without Legislation.

79. *B. D.* 8 *cotton extension scheme.*—This scheme is put in force from December 1935 with one graduate Assistant and 2 Kamgars paid by the Indian Central Cotton Committee. Seed obtained from 1935 season was supplied to Nabipur group, Velit and Ninam Co-operative Credit Societies and Jhadeshwar village. Second hand seed was distributed in Jambusar Taluka villages round about Kora and Kavi ginning factories. A regular survey of B. D. 8 cotton fields was done and the following were recorded.

	Acres.	Kapas (pure) in Bhars.	
Nabipur group	640	330	
Ninam Co-operative Credit Society ..	275	106	(at Amod)
Velit Co-operative Credit Society ..	587	179	(at Derol)
Jhadeshwar	249	96	
General area in Jambusar	1,273	711	bhars

The general area outturn was collected as mixed cotton for all practical purposes but 711 bhars were obtained in pure form for ginning. It resulted in 725 kalsis cotton seeds and 615 full-pressed bales of lint. The lint was sold away in several lots at premiums varying from Rs. 37 to 50 on Broach terms. Out of 725 kalsi of seed produced only 300 kalsis could be disposed off for seed purposes. Apathy of gin-owners in general and low premiums obtained for lint are the principal causes which retarded the seed distribution work. The Collector allotted Rs. 542 from the V. U. L. grant which enabled the Department to make the seed available to selected villages at a flat rate of Re. 1 per maund.

Surat District.

80. *Cotton seed multiplication and distribution.*—The Sonsak group Co-operative Cotton Sale Society which was taken up last year as a controlled area gave up 1027 A.L.F., and hence it was excluded from the Departmental supervision. However two Societies near Kim and two in Chikhli Taluka have been supplied 1027 A.L.F., seed from Athwa group with the clear understanding of working under the control of the Department and it is hoped that there will be more than sufficient area for seed multiplication in the next season. The area under Departmental control was 12,826 acres of which 1,237 acres were grown with Surat Farm pedigree seed. The total quantity of kapas ginned was about 3,144 bhars giving nearly 1,270 candies of lint—

		lbs.
Seed production	Surat Farm produced ..	23,698
	Seed purchased from groups ..	16,94,879
	Total ..	17,18,575

Further to make up a very large demand from Rajpipla State 8,88,818 lbs., of reliable seeds from outside group areas were purchased. Thus the total quantity of seed purchased amounted to 26,07,393 lbs. Besides 79,616 lbs. were directly supplied by Hansot Co-operative Cotton Sale Society to its members which when added comes to 26,87,009 lbs. total quantity handled by the Department.

It was for the first time that enquiries were received for improved 1027 A.L.F., seed from the gin-owner in Bansda State and the stock was readily supplied in order to secure co-operation of the State for the introduction of Goghari legislation in their territory.

The noteworthy feature of the season was that the gin-owners being requested heaped and ginned separately good quality cotton grown from genuine 1027 A.L.F., seed and purchased by them at a higher price than the prevailing market rate. The resultant seed was either sold to Baroda State or distributed to their own clients. Similarly a gin-owner at Surat and Bardoli purchased 1,01,150 lbs. Departmental seed for supplying to his clients. It is a happy sign that the gin-owners have come to realize the importance of good seed and it is hoped that if the same spirit continues for some time the quality of Surat cotton will improve considerably. Out of 26,87,009 lbs., seed 12,09,063 lbs. were supplied to British residents in the District by opening 26 Depots and 14,77,946 lbs. were supplied to Native States of Rajpipla, Bansda, Idar and Baroda.

81. *Jowar Budh Perio No.* 53.—In order to spread the improved variety rapidly a scheme of supplying farm seed at half the concession rate to a selected cultivator in five villages of each of the following four Talukas (viz., Olpad, Chorashi, Bardoli and Jalalpore) has been introduced since last year and accordingly five new centres in each Taluka will be taken up every year. The quantity of fresh seed supplied comes to 15,108 lbs.

82. *Rice.*—The trial of K 184 was taken at Amalsad and compared with local Kada variety. K 184 was ready by about a week earlier and yielded 445 lbs. more per acre. The results of past four years show an increase of 169 lbs. per acre. It seems the strain does not fare uniformly in different seasons.

83. *Wheat.*—The trial of Pusa 4 was continued at Talavchora and yielded 4,800 lbs. from an area of 8 acres or 600 lbs. per acre. Its outturn in previous 3 years was as under and the average of four seasons comes to 753 lbs. per acre—

1932–33.	1933–34.	1934–35.	1935–36.	Average.
701	933	780	600	753

84. *Sugarcane—P.O.J.* 2878 *and E. K.* 28.—These two varieties were introduced in 1933–34 on a small scale for seed multiplication. From the results of two years it is observed that both of them have done equally well giving over 10,000 lbs. gul per acre each. The varieties are spreading

and occupied in all nearly 16 acres round about Pardi, Bulsar, Chikhli and Amalsad. CO. 213 on account of its hardiness is spreading rapidly in cane growing talukas of the district. A comparative trial of CO. 300 and CO. 281 was taken along with P.O.J. 2878 and E.K. 28 and this year's results show the superiority of CO. 300 over the rest in point of yield CO. 281 considered an early variety in U. P., does not show to be early here. CO. 300 is a late variety and the gul of E.K. 28 was superior to all—Other varieties, viz., CO. 212, CO. 290, CO. 313, CO. 349, P.O.J. 2883 and H.M. 320 grown for seed multiplication are now grown on small area for being tested.

85. *Distribution of manure.*—Sulphate of ammonia is now mostly used as a top-dressing in cane crop and about 25 tons were used. Similarly 5 tons of Bone-meal was used for manuring fruit trees in Chikhli Taluka. Besides 30,400 lbs. denatured salt was supplied during the year.

86. *Distribution of seeds, plants, implements, etc. :—*

Sugarcane CO. 213	9,00,000	Sets
P.O.J. and E.K. 28	12,750	„
Other varieties	800	„
Suran	17,200	Lbs.
Ginger	4,480	„
Yams	200	„
Mango and Chikoo grafts ..	300	.
Mango and Chikoo grafts ..	150	Out of the
Banana suckers	200	District.
Sann seed	7,840	Lbs.
Power crushers	3	
Improved ploughs	4	

87. *Demonstrations.*—In all 10 demonstrations were held in South Surat area for improved furnace, power crushers, dusting mango trees, etc. and a Conference at Bulsar under the auspices of Village Improvement Committee.

88. In Southern Gujarat Fruit and Vegetable Growers' Association deputed two representatives in Northern India to explore suitable markets for fruits. The Association also exported 20,000 parcels of fruits to Bombay at concession rates and effected considerable saving.

89. *Boll-worm Control Scheme.*—The propaganda of plant-pullers was not widely done during last year due to frost in the District. Accordingly 21 kamgars were appointed early in February this season in order that people may know in advance about the arrangement made by the Department for supplying plant-pullers which could be purchased from ginning factories when they happen to visit same for delivery of kapas. Besides the meetings convened for the purpose of Goghari elimination were taken advantage of and they were all attended and addressed at full length personally by the Cotton Superintendent. A further propaganda was carried out by distributing leaflets, fixing

posters, and giving vernacular articles in the monthly magazine. The V.U.L. Committee of Ankleshwar had provided Rs. 125 for 500 plant-pullers to be supplied at a concession rate. The total number of plant-pullers distributed during the year comes to 2,253. It is gratifying to note that people have been realizing the advantages of up-rooting cotton stalks. Wherever the stalks are thin due to peculiarity of soil conditions and the consequent closer sowing and little thinning the plants have to be dug out little deep to prevent sprouting. Good progress has been made in Surat District, yet there remains the necessity of continuing the propaganda until the majority of cultivators practice it.

The following statement will give the idea as to how far the cleaning method has been adopted and practised by cultivators in different talukas :—

Statement showing the number of plant-pullers in use and area of cotton stalks up-rooted in 1935-36.

Name of Taluka.	Number of plant-pullers supplied during				Total Number working.	Estimated area of cotton in acres.	Approximate area up-rooted.	per cent.
	1934.	1935.	1936.	From other sources during all these years.				
1	2	3	4	5	6	7	8	9
Ankleshwar Hansot	300	282	843	835	2,260	65,000	22,600	35
Olpad ..	300	122	369	3,123	3,914	53,125	35,434	67
Chorashi ..	200	150	243	511	1,104	22,000	11,000	50
Mandvi ..	3	50	121	100	274	32,129	2,587	8
Valod ..	233	..	21	..	254	15,000	2,400	15
Bardoli ..	300	37	234	77	648	30,000	6,200	20
Jalalpore ..	162	75	145 96	168	646	23,000	6,000	26
Chikhli ..	38	23	181	1	243	16,000	2,000	12
Total ..	1,536	739	2,253	4,815	9,343	2,56,254	88,221	34

90. *Survey of Goghari.*—As in the past year the work was taken up in right earnest and six kamgars who worked during last season were appointed from mid-December for the purpose. Our observations indicate that last two years' propaganda and the actual field to field survey done during the last season has a marked effect resulting in the decrease of area under Goghari. The area which was estimated to be nearly 6,000 acres in 1933-34 was reduced to 1,813 acres under Goghari

mixture in 1934-35 and it has further gone down to only 660 acres in Jalalpore Taluka this year; while in Ankleshwar Taluka it has been found to be under 136 acres. A wide spread propaganda has been done by convening over a dozen meetings under the auspices of Revenue Officers at prominent centres; by distributing book-lets, fixing posters, play-cards and giving publicity in local news papers and monthly magazines. Now that the legislation has been passed and a vigorous campaign carried out to see that the Act is made known to each and every individual throughout the area by the beat of a drum with the help of Mamlatdars, it is hoped that Goghari will be completely eliminated.

V—Organisation.

91. *Divisional Board.*—Under the Chairmanship of the Deputy Director of Agriculture, Gujarat, from the month of November 1935 three meetings of the Board were held. The members took keen interest in the deliberations of the subjects and particularly in the Cotton Ginning and Pressing Factories Act for which the opinion of the Board was invited by the Director of Agriculture, Bombay Presidency, Poona. The members in spite of their varied activities have tried to attend all meetings and rendered hearty co-operation.

92. *Taluka Development Associations.*—Out of six Taluka Development Associations in Gujarat five have sufficient funds to do very useful work independently of the Departmental help. The sixth, viz., South Daskroi in Ahmedabad is not in a position to maintain the staff however with the help of the Departmental Kamgar and a subsidy of Rs. 300 from the V.U.L. Committee it is doing good work for the agricultural improvement in the Taluka. It is now hoped that with the revised procedure of giving grants by the Joint Board this Association will get good impetus and will be in a position to stand equally with others in the Division.

93. The new Gujarati monthly magazine "Khedut, Kheti and Sahakar" continued its publication under the auspices of the publishing Committee consisting of four members two representing Co-operative and other two representing Agricultural interest. It is thus hoped that this magazine will be able to fulfill the object for which it is published. The Department has arranged to purchase 500 copies of the same for free distribution to leading cultivators and others interested in agricultural matters in all the Districts of Gujarat.

VI—Agricultural Service.

94. *Supply of Premium bulls.*—The demand for premium bulls had fallen during the year due to the price of the bull being raised from Rs. 50 to Rs. 100 each. However one cow bull and 4 buffalo bulls have been supplied in Kaira, 5 bulls in Panch Mahals, 3 in Surat and Rs. 1,400 and Rs. 1,000 have been provided for supply of premium bulls from the Village Uplift grants by District Committees of Ahmedabad and Surat respectively.

95. *Mechanical help.*—During the year under report the Mechanical Assistant was on seven months' leave. He received 49 applications (including 6 of last year) ; of these 30 were from Surat, 4 from Broach, 9 from Panch Mahals and 6 from Kaira District. During the period of five months 36 were attended and 13 were kept pending. There were good many inquiries from N. C. D. but these could not be attended due to illness of the Assistant. He was out in the District for 73 days. Details of work done by him are as under :—

(1) Erection of pumping plants ..	6
(2) Site surveys	14
(3) Supplied estimates and drawings ..	14
(4) Advice in repairing, pump and tractors..	16

VII—Educational Work.

96. The staff inspects and examines Agricultural bias classes and conducts Vernacular Final Examination with Agricultural bias in all the Districts.

VIII—Publicity.

97. Good many members of the staff contributed articles to the *Khedut, Kheti and Sahakar* monthly magazine published by the Joint Committee representing interests of Agricultural and Co-operative Departments. Similarly advantage of local newspapers was taken for doing propaganda against Goghari by giving short articles and accounts of meetings etc.

B. S. PATEL,
Deputy Director of Agriculture,
Guiarat. Surat.

Surat, 10th August 1936.

Programme of work to be done under the Deputy Director of Agriculture, Gujarat, Surat, for the year 1936-37.

I—Research.

Surat.

(*a*) COTTON.

1. Evolving a type that will spin higher than 1027 A.L.F., while maintaining its fibre qualities—
   (*a*) by selection from the local material,
   (*b*) by selection from the crosses and back-crosses,
   (*c*) by inter-specific crosses.
2. Dibbling trial at $1\frac{1}{2}$" depth using 3–4 seeds, to economise selfed seed.
3. Vernalization experiment.
4. Comparative yield tests of 1027 A.L.F. *v.* B.D. 8 and a selection from third treatment of vernalization.
5. Production of selfed seed of 1027 A.L.F. and B.D. 8.

(*b*) JOWAR.

1. Maintenance of types.
2. Production of selfed seed of Budh Perio 53.

Broach.

COTTON..

1. Evolving a type that will be resistant to wilt, ginning percentage higher than B.D. 8 and with other fibre characters of B.D. 8—
   (*a*) by selection as in N.S. 49 and N.S. 12,
   (*b*) by selection from crosses,
   (*c*) by inter-specific crosses.
2. Seasonal wilt study.
3. Comparative yield trials of N.S. 12 and B.D. 8.
4. Production of selfed and pure seed of B.D. 8.

JOWAR AND WHEAT.

Jowar—

1. Evolving a type superior to No. 8—
   (*a*) by selection from the crosses,
   (*b*) by making back-crosses.
2. Production of pure seed of No. 8.

Wheat—

1. Selection of types from hard white and hard red wheats.
2. Taking preliminary yield trials of promising selections.
3. Taking replication trials of Bansi strains 224 and 164 with local.

Nadiad.

(*a*) Tobacco.

1. Evolving types suitable for cigarette and for local use—

(*a*) by selection from crosses viz., White Burley × P. 45 and from N. 10-3, Early Adcock and G. 6 × Adcock,

(*b*) by selections from Keliu.

2. Comparative yield trials—5 cultures of Keliu with local, Harrison special *v.* N.10-3.

3. Evolving cheap method of curing with the acclamatized foreign types and with new local cultures, as to be suitable for export.

4. Study of economics of Harrison special *v.* G. 6.

5. Testing the best method of raising seedlings.

(*b*) Bajri.

1. Evolving better pure types by purification in the promising cultures.

2. Comparative yield trials of four cultures with local.

(*c*) Castor.

1. Evolving high yielding pure types from S. 5, 9 and 20 by selecting for high number of female flowers.

2. Replication trials of two cultures of S. 5 and one of S. 20 with local.

Viramgam.

(*a*) Cotton.

1. Evolving a type superior in fibre characters to local to spin higher than local under Mill conditions—

(*a*) by selection from the individual selections on hand and from the ocal,

(*b*) by selection from the crosses.

2. Comparative yield trials of 4-1 and 7-1 with local and Wagad 8.

3. District trials of 4-1 with local.

(*b*) Jowar.

1. Selections from the material on hand.

2. Yield trials of four types with their respective locals.

Surat Farm.

1. The experiments on manures, ridge cultivation, spacing and Dhaincha green manuring will continue.

2. The seed multiplication work for cotton and jowar will also continue.

3. Maintenance of Dairy herd of best Kankrej milch cows and giving out premium bulls.

4. Observations on early maturity, and effect of mineral feeds.

Broach Farm.

1. The experiment of cotton manuring will be continued.

2. Observations on the residual effects on jowar, effects of groundnut and jowar rotation on cotton, Dhaincha green manuring on jowar and cotton crops will continue.

Dohad Farm.

1. Production of pure seeds of Spanish peanut, maize, gram, etc.

2. Holding drill and interculturing classes.

II—Propaganda.

Surat.

1. Control of seed multiplication of 1027 A.L.F., at gin group centres and distribution of the resultant seed in the tract lying South of river Narmada.

2. Elimination of Goghari in Jalalpore and Ankleshwar Talukas.

3. Spread of Budh Perio jowar No. 53 through registered seed growers at twenty centres in the District.

4. Spread of clean-up measure for controlling cotton Boll-worm.

5. Trial of sugarcane varieties and spread of Co. 213.

6. Propaganda of sulphur dusting of mango trees against hoppers and advocating proper manuring of fruit trees, rice and sugarcane.

Broach.

1. Advocating sann-green manuring in fallow lands.

2. Propaganda against jowar smut.

3. Spread of clean-up measures for controlling cotton Boll-worm.

4. Seed multiplication and extension of B.D. 8, Wheat No. 224 and rabi jowar No. 8.

5. Extension of groundnut as a good rotation crop.

6. Trials of 168 and 808 wheat at suitable centres.

Kaira.

1. Seed distribution of gandiu No. 6 and Piliu No. 28.
2. Trials of wider sowing of bajri, bavto, kodra.
3. Varietal trials of sugarcane, groundnut, wheat, castor, rice, etc. will continue.
4. Manurial trials of bajri, bavto, kodra and rice.
5. Sulphur dusting on jiru against mildew.
6. Horticultural advice to cultivators regarding methods of cultivation and manuring of fruit trees.

Panch Mahals.

1. Use of drills for wider sowing of maize and wheat.
2. Extension of Spanish peanut, Pusa 4, Farm maize seeds.
3. Spread of sugarcane Co. 213, improved crushers, pans and furnaces for gul-making.
4. Advocating the use of Sulphate of ammonia for rice and Sugarcane.
5. Varietal trials of groundnut, paddy, rabi jowar and sugarcane will be done.

Ahmedabad.

1. Trials of Wagad strain 4-1 and Banilla cotton.
2. Wider sowing of cotton and wheat.
3. Varietal trials of wheat, paddy, bajri, groundnut, castors, etc.
4. Advocating use of Sulphate of Ammonia to rice seedlings and to the field crop.
5. Advocating filling of siloes and feeding of silage to cattle.
6. Rural Up-lift work Ghogha Mahal for general agricultural improvement in the Taluka.
7. Extension of fruit culture.

B. S. PATEL,
Deputy Director of Agriculture,
Gujarat, Surat.

Surat, the 9th August 1936.

APPENDIX G.

Summary of Work done under the Professor of Agriculture, Poona, for the Year 1935–36.

1. *Charge.*—Mr. R. Y. Hulkoti acted as Professor of Agriculture from 29th April 1935 to 7th December 1935 from which latter date Mr. V. G. Gokhale resumed charge of that office on his return from leave abroad.

2. *Staff.*—Mr. A. R. Neginhal acted as Assistant Professor of Agriculture from 23rd April 1935 to 23rd December 1935 from which latter date Mr. R. Y. Hulkoti acted in this post up to 2nd March 1936 until the return of the permanent incumbent Mr. K. S. Kulkarny, who was transferred to officiate as Cotton Superintendent, S. M. C., Dharwar, from 23rd April 1935 to 12th March 1936. The personnel of three out of five non-gazetted members of the section also changed. So many changes in the permanent staff simultaneously had their effects on the efficiency of the section.

3. *Lines of work.*—These remained the same as in the previous years.

A—*Teaching.*

4. The new course of studies for the B.Sc. (Agri.) degree which commenced in 1934–35 was in its second year. The final year class was continued according to the old B.Ag. degree course of studies for the last time. The teaching of the geological and soil formation part of the agricultural course of the First Year in Science (Agri.) class came to this section, thus bringing the whole of soil study including Soil Physics under the Agricultural Section.

The following shows the result of the University Examination in the subject of Agriculture :—

Examination.	Number of students appeared.	Number of students passed.	Percentage of passing.	
			1935–36.	1934–35.
1. First Year in Science (Agri.) ..	80	60	75	85
2. Second year in Science (Agri.) ..	42	41	97·6	*
3. B.Ag. degree	61	46	75·4	76·4
(*i*) Intensive study of sugarcane ..	7	7	100	92·8
(*ii*) Advanced Animal Husbandry and Dairying	5	5	100	85·0

*First examination as per new syllabus.

Special courses.—Three students were given special training in crop production and six students in Dairying for periods varying from two months to nine months.

5. *The College farm.*—This farm is maintained primarily for the instruction in practical agriculture to all the classes of the College. It also affords facilities for field researches of the other sections of the College. A collection of various agricultural implements both indigenous as also

modern, an interesting living museum of all the crops and small workshop in which the first year students get their training in carpentry and smithy continued to be maintained. The area of the farm remained at about 275 acres as in the previous year.

(*a*) *The Season.*—There were no anti-monsoon showers during this year and this delayed the land preparation. The total rainfall amounted to 23·25 inches as against 18·68 inches of the previous year and was about 77 per cent. of the annual average. The monsoon began on the 8th of June 1935 and gave enough rain for commencing *kharif* sowing in the last week of June. Except for the rather heavy rainfall of 4·38 inches in the latter part of October which washed down flowers of gidgap *jowar*, the *kharif* rainfall was on the whole favourable. There were no rains at all in the winter season and thus caused some setback to the *rabi* crops.

The winter, during the year under report, was not on the whole cold enough besides there being a number of cloudy days encouraging aphis attack on cotton and brinjals. The lowest temperature was 36° F. only in the last week of January.

As regards insect pests and plant diseases the year under review might in general be considered as remarkably free from these troubles. The cattle on the Agricultural College Farm remained in good condition.

The effect of this year's season may be seen from the following :—

Crop.	Yield per acre.		Best yield per acre in the study of the farm.	
	1935–36.	1934–35.	Year.	Yield.
Bajri	945	1,788	1934–35..	1,788
Groundnut (S. P. nut)	1,260	921	1912–13..	2,082
Cotton (N. R.)	965	595	1919–20..	1,900
Jowar (Shalu) (Maldandi)	1,533	2,278	1928–29..	2,578
Cotton (Broach)	1,533	475	1935–36..	1,533
Groundnut (Big Japan)	1,640 (Dry). 592 (Green).	1,230	1929–30..	2,214

As regards irrigated crops, the year, on the whole, was quite satisfactory. The noteable per acre yields are *suran* (Elephant foot) 37,000 lbs., sweet potatoes about 13,274 lbs., sugarcane 12,225 lbs. (*gul*), Tomatoes 14,000, *Bhopala* (pumpkin) 21,256 lbs., *Dudhia* (Bottle gourd) 11,253 lbs., onion for bulbs 29,379 lbs. Crops that gave poor yields were tobacco 600 lbs., onion for seed 264 lbs.

B—*Research and Investigation.*

6. *Relation of Humus in the use of sulphate of ammonia as manure.*—This experiment was kept in abeyance as desired by the Cresco of April 1935

pending the arrival from leave of Prof. V. G. Gokhale to replan the scheme.

7. *Position of leguminous crops in rotation with a cereal.*—In the full series of *54* plots there was no difference in the yields of *bajri* between *bajri* after *bajri* or after *kulthi* but the latter showed statistical superiority in another series of *27 plots* of lighter soils. Considering the other crops grown, soyabean as a rotation crop showed the best effect on *bajri* yield, *tur* as a row mixture and sesamum standing next and equal to each other. In the five years past *bajri* after *kulthi* has been significantly superior to *bajri* after *bajri* in the first two years while it has been equal to it thrice. From the financial point of view during the past five years, *bajri* after *bajri* has shown greater advantage while in the year under report *bajri* and *tur* mixture showed the largest advantage, *bajri* after sesamum stood next and *bajri* after *bajri* third.

8. *Effect of different kinds of preparatory tillage with or without manure on the dry crops in the Deccan.*—As regards N. R. Cotton, superior tillage, *i.e.* plowing the land with a turn wrest plough, about 7 inches deep, did not show any difference as compared with the shallow tillage obtained by a blade harrow. 5 cart of farm yard manure showed a significant advantage over no manuring only when associated with plowing but in the previous year, manuring even a harrowed plot gave significant advantage over plowing and even plowing associated with manuring.

In the case of gidgap *jowar*, the crop was highly damaged by rain at the time of flowering and the grain yields which were very poor when studied showed no difference between the two kinds of tillage or between the manuring and no manure. During the last four years plowing stood superior to harrowing twice and equal twice while manuring showed advantage thrice. As regards fodder, however, though the two kinds of tillage showed no difference, manuring whether on the plowed plots or harrowed plots showed significant increases of 44 per cent. over no manuring as it did once in the past 4 years.

9. *Economics of dry-farming under Poona conditions.*—In this seventh year of this study on a unit of 35 acres, the field work occupied 4 members of the family of 278 days at 9·6 hours per day. The additional labour engaged, in times of rush of work, was 88·5 men and 283·75 women units. One pair of bullocks worked for 221 days in addition to 31·5 units of bullocks which had to be hired. The labour income of the family was Rs. 304-5-9 as against Rs. 259-5-0 for the last year owing to better yield of chillies and higher rates. The family expenses went down to Rs. 389-5-6 from Rs. 419 of last year chiefly because of purchase of less milk.

10. *Manurial trials of vegetable crops.*—The study of artificial manures for brinjals, was done in two ways. In the experiment where for the first time only sulphate of ammonia was compared with farm yard manure, the addition of the former showed no advantage. In the other experiment where the addition of N (as sulphate of ammonia) P and K were compared, N singly or in combination gave significant increases of 35 to 47 per cent. over farm yard manure only. Potash with Nitrogen

shows a better effect (22 per cent.) over nitrogen alone while P does not show any advantage either alone or with nitrogen. During the previous two years, the addition of K P N, K N and N showed significant advantage over farm yard manure alone while K alone showed a depressing effect. The trial of K P and N as against only farm yard manure on sweet potatoes showed as in the last two years, no advantage.

11. *Business management of a garden holding.*—This study in its fourth year, showed again very clearly that it was possible to frame in advance a cropping scheme and financial forecasts which can be realised. The actual expenditure for an area of 8·5 acres of garden cultivation under trial, was Rs. 2,776 as against the estimated amount of Rs. 2,250 while the income amounts to Rs. 4,045 as against the estimates return Rs. 3,492.

12. *Trial of Soya Beans.*—Eleven varieties of soya beans were grown each on one-fourth of an acre on a rather very light soil. The yields per acre have varied from 135 to 501 lbs. and the ripening period from 95 to 124 days.

13. *Trial of Lespedeza (a leguminous fodder).*—This crop was grown in order to obtain sufficient seed for a larger trial next year. The growth was poor and only about 3½ lbs. of seed has been obtained.

14. *Development of higher milk yield in cows and buffaloes along with early maturity and regular calving.*—The programme laid out in 1929 for further improvement of Sindhi cows and Surti Buffaloes by In-breeding, line-breeding and out-crossing was continued.

Sindhi cows.—No further material has been available during the year in regard to out-crossing with Tulip Bull of Sindhi cows. Out-crossing with one more Sindhi bull has been taken up.

In the line-breeding none of the births during the year showed resemblance to the lines in respect of colour.

Surti Buffaloes.—The only one in-bred daughter (Bhaghtur No. 114) obtained by in-breeding Bhagi buffalo with her son Dairy Butter calved for the 2nd time giving premature birth to a male calf.

The milk yield of the first lactation was 6·7 per cent. less than that of corresponding period of Bhagi.

Five heifers from other breeding policies have come in milk for the first time during the year. In all cases the milk yields are less than that of the line in the corresponding periods.

15. *Postponement of service beyond first heat.*—This study which has been, in the previous reports, given under the heading "Regulation of Bull services" was continued.

The original line of investigation, the extent to which the heats can be skipped over for service, which was taken up from the year 1932-33 was kept in abeyance during the year under report and was diverted, at the recommendation of the Cresco, to see whether the desired number of animals could be got served in every month of the year by skipping over their first heat and teasing if necessary.

The desired number of services could be obtained out of a herd of 69 till the close of January 1936 including 5 animals which came in their second heat without teasing after their first heat was skipped over in the months of October and November.

During the remaining months of the year under report the desired number could not be made up by the first heat animals, 40 per cent. of animals served in heat not holding. There was no occasion for attempting teasing as there were no animals whose first heat was skipped over.

C—Commercial working of the College Dairy.

16. The year began with 248 and ended with 228 heads of cattle against 238 and 248 respectively of the last year. The drop at the end is mainly due to out-break of rinderpest.

17. There appeared two epidemics—foot and mouth and rinderpest—during the year commencing at Manjri as there is no separate arrangement of watering the herd except the nalla where all the village and cattle of traffic drink water.

18. Rinderpest commenced first at Manjri on 29th August 1935 and infection was carried to the herd at the Kirkee Dairy through the animals that were brought for auction sale before the disease was detected at Manjri.

19. The incidence of affection and results are given in the following table :—

—	Cow class.				Buffalo class.				Total No.
	Adult.		Young stock.		Adult.		Young stock.		
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	
Total No. ..	26	31	12	28	7	89	38	46	277
Inoculated ..		All the	cattle.			All the	cattle.		
Died ..	1	1	*Nil.*	*Nil.*	..	6	2	2	12
Pregnant affected ..	..	4	..	2	..	10	..	9	25
Affected pregnant aborted ..	..	3	..	2	..	4	..	4	13
Affected pregnant died	..	1	..	..	..	6	..	..	7

The milk yield of the affected animals was 37·7 per cent. less than their normal yield over a period of 5 months.

Preventive and curative measures were immediately taken by inoculating the herd at an interval of every 9 days. The first inoculation was given on 10th October 1935 and the last one was on 18th November 1935.

20. The attack of foot and mouth disease was first noticed on 24th February 1936 and in all one cow-heifer, one buffalo-heifer and one she-buffalo got affected.

21. The average yield of the cows and buffaloes stood at 3,380 lbs. and 3,556 lbs. respectively as against 3,564 lbs. and 3,798 lbs. respectively of the last year. The decrease of 184 lbs. in case of cows and 242 lbs. in case of buffaloes is solely due to the abortions caused by rinderpest.

22. The cost of production of 100 lbs. of milk is about 2 per cent. less than in the previous year which is mainly due to the lower salaries of the Agricultural establishment while the realisation have remained practically the same as last year.

23. The total area under fodder crops was 226 acres 5 gunthas against 190 acres and 22 gunthas cropped this year. Out of this 69 acres and 19 gunthas were cropped twice. The increase in the total acreage was due to failure of 17 acres of Nilwa crop which had to be sown late, because of late monsoon, thus necessitating more area under shalu crop. The cost of production worked out at 6·74 annas per 100 lbs. of green fodder as against 6·47 annas per 100 lbs. of green fodder last year. The reason for this increase was due to increased expenditure on monsoon irrigation due to late rains and failure of 17 acres of Nilwa crop, at Manjri.

24. The grazing of 38 acres furnished forage equivalent to full requirements of 19·5 adults for 120 days as against 12·5 adults for the same period last year due to good late rains in the year under report. The compartmental grazing of 12 acres in four blocks was continued and carried 5·7 adults for 38 days as against 7 adults for 30 days last year, both of which work out to be equal and some grass remained ungrazed, as the required number of cattle was not available for this grazing in October due to rinderpest.

D—Aid and Assistance to the Public.

25. *Help to other sections of the College.*—About 7½ acres of land was kept at the disposal of other sections of the College as also the Agricultural Meterologist for their researches. In addition, help in the form of labour and implements was also given to the several sections when possible.

26. *Visitors.*—A large number of persons and parties including students of various educational institutions, local as well as mofussil, from different parts of the Presidency and outside, visited and were shown round the Farm and the Dairy. Among the prominent ones were His Highness the Maharaja of Bhavnagar and Mr. J. A. Madan, I.C.S., C.I.E., Secretary, Revenue Department.

27. In all over 600 enquiries were received and dealt with regarding implements, seeds, manures, crop growing, cattle feeds, dairy products, dairy and machinery dairy management, clean milk production, etc.

28. *Bull Services.*—During the year the College Dairy supplied 32 bull services, 21 being to cows and the remaining to buffaloes. The decrease was due to suspending this help during the rinderpest epidemic period.

29. *Publications.*—The following were the publications during the year :—

By Mr. A. K. B. Cazi—

(1) *Poultry diseases—a general discussion on—*
Poona Agricultural College Magazine, Vol. XXVII, No. 1, July 1935, pp. 29-31.

(2) *Rural Up-lift through organisation of Live-stock industries.*
Poona Agricultural College Magazine, Vol. XXVII, No. 2, September 1935, pp. 83-86.

By Mr. C. N. Dave—

(3) *Butter trade in Gujarat (Kaira District)—*
Agricultural College Magazine, Vol. XXVII, No. 1, July 1935.

(4) *Surti Breed of Buffaloes—*
Agricultural College Magazine, Volume XXVII, No. 2, September 1935.

V. G. GOKHALE,
Professor of Agriculture.

Summary of Publications done in 1935-36.

Publications by Mr. A. K. B. Cazi—

(*i*) *Diseases of poultry—a general discussion.*—Market birds often act as carriers of disease like fowl cholera. Care should be taken while introducing such birds in farm stock. Feeding on scientific principles, care about sanitation and prophylactic measures are important. External parasites should be treated with kerosene oil emulsion. A dose of *Neem* leaves decoction internally is very useful.

(*ii*) *Rural Up-lift through organisation of Live-stock industries.*—This discusses and suggests measures for commercialising Dairying along with stock improvement on a co-operative basis with Government aid.

Publications by Mr. C. N. Dave—

(*i*) *Butter trade in Gujarat* (*Kaira District*).—The present supply of 60,000 to 70,000 lbs. of milk is sold to a number of creameries or turned to cream or ghee and then sold. Creameries sell cream to butter-makers in Ahmedabad, Poona or Bombay who pay on butter basis on rates varying from annas 9 to annas 13 per lb. of butter yield. The article suggests that creamery owners should sample out their cream and make butter themselves for testing the figures reported by cream purchasers and thus avoid losses due to wrong reports.

(*ii*) *Surti Breed of Buffaloes.*—Discusses some of the records of Surti Buffaloes at the College Dairy such as the following :—

(*a*) Average adult weight of a breeding bull is about 25 per cent. more than an adult female.

(*b*) The female calf weighs about 1/18 of the weight of its dam and the male calf about 1/22 of the weight of its sire.

(*c*) Average age of a she-buffalo at first calving is about 3 years 8 months and 19 days.

(*d*) Gestation periods averages to about 312·7 days.

(*e*) Morning milk gives an average of 7·51 per cent. of fat and evening milk about 8·23.

V. G. GOKHALE,
Professor of Agriculture.

Programme of Work under the Professor of Agriculture, Agricultural College, Poona, for the year 1936-37.

I. Teaching.

Teaching is the primary function of the staff of the Professor of Agriculture's section and this work will continue as in the last year. This will occupy about 60 per cent. of the time of the staff.

II. Administration.

In connection with the teaching, two large institutions, viz. the College Farm and the College Dairy, have to be run. The work under this section has increased steadily owing to greater and greater details in account and audit matters.

The heavy retrenchment of three graduate assistants and three non-graduate assistants from 1st March 1932, has increased the burden on the remaining staff.

III. Investigations and Research.

Only about 10 per cent. of the time of the staff is thus available for this work. Therefore only such pieces of investigation and research can be tackled as would be possible in such a broken up time. Subject to this limitation the following shows the programme under this head :—

A—Omission from the programme for the last year.

	Subject.	Investigator Professor of Agriculture in collaboration with	Reasons.
1.	Manurial trials on sweet potatoes.	Mr. A. R. Neginhal ..	Completed.

B—Continuation of last year's programme.

	Subject.	Investigator Professor of Agriculture in collaboration with	Reasons.
1.	Manurial trials on brinjal ..	Mr. A. R. Neginhal ..	Further testing.
2.	The most profitable scheme for vegetable growing.	Mr. A. R. Neginhal ..	Do.
3.	The influence of different kinds of preparatory tillage.	Prof. K. S. Kulkarny ..	Do.
4.	The study of dry farming unit round Poona.	Mr. K. R. Patel	Do.
5.	Position of organic matter in the application of artificial fertilizers.	Mr. K. R. Patel	Do.
6.	Position of leguminous crop in rotation with cereals.	Mr. R. M. Chaudhari ..	Do.
7.	Trial of soya beans ..	Mr. R. M. Chaudhari ..	Do.
8.	Development of higher milk yield in cows and buffaloes by breeding along with early maturity and regular calving.	Assistant Professor of Animal Husbandry and Dairying.	Do.
9.	Requirements of concentrated feeds for Dairy cattle in the	Messrs. G. V. Hardikar, Lecturer in Dairying, and J. J. Patel, Demonstrator in Dairying.	Others to be tried.

V. G. GOKHALE,
Professor of Agriculture.

APPENDIX H.

Summary of Work done under the Agricultural Chemist to Government, Bombay, Poona, during the year 1935–36.

Professor N. Narayana was in charge of the office and the laboratory from the 1st of July to the 15th of December 1935. From that date onwards, I took over charge and held it to the end of the year i.e., up to the 30th of June 1936.

The work under the Agricultural Chemist is ordinarily divided into the following categories :—

I. Analytical and advisory.
II. Research work.
III. Teaching.
IV. General.

I—Analytical and Advisory Work.

This includes analyses of samples and advice based on the analysis and also visits to the places when necessary. During the year under report, the total number of samples received was 755. Out of these 701 were from the Agricultural and other Government Departments and 54 were from private persons or concerns connected with agriculture. Since fees for private samples were introduced the number of samples from that source has considerably gone down and it will take some time before it rises to the original number.

Government samples included chiefly the following :—

Samples of soils (343 samples) were received from Government Farms in connection with the experiments that are being carried on there. Soil samples from the Professor of Agriculture, Poona, were in connection with his experiments to study the effects of rotation on the nitrogen contents of the soils. The Deputy Director of Agriculture, Gajarat, Surat, sent soil samples from Surat Farm plots where sulphate of ammonia is used as a manure. This experiment is to test the change in soil reaction. Samples of manures were for the usual analytical data. Samples from the College Dairy were for feeding value of the stuffs they use for their animals. Samples of Ghees and butters were done for the Live Stock Expert to Government, Bombay, Poona, to see where and to what extent adulteration of Ghees and butters is carried on. Several samples of milk and ghee were received from the Central Mental Hospital, Yeravda, Poona, for detection of adulteration. Samples of Jowar stalks of different strains grown on the Viramgaon Farm were analysed for their food value and for their sugar contents. Tobacco samples for the Tobacco Breeder, Nadiad, were done for complete analysis and those from the Professor of Entomology, Agricultural

College, Poona, for their nicotine contents. Samples of nitrogen cultures from the Plant Pathologist to Government, Bombay, Poona, were analysed for him.

II—Research and Publication.

1. Nitrogen fixation in Rice Soils was continued from the previous year and was completed.

2. A study of the Ash constituents of foods and cattle feeds was completed and will soon be sent for publication.

3. A study of the Proteids and oils from groundnut seed has been completed and the work will be soon put together.

4. A study of the relation of lime and phosphoric acid in soils and crops grown on the same soils was carried on but no correlation was observed.

5. Studies in Protein of Bajri will be soon finished.

6. A study of the effects of organic matter on soils treated with sulphate of ammonia. The experiments were completed and the results were submitted to the Cresco.

7. Studies in ripening of fruits are being continued.

Publications.

1. Nitrogen Recuperation in Soils Part IV. Indian Journal of Agricultural Science, April 1936.

2. Nitrogen Fixation by Rice Soils and Rice Plants. Pro. Ind. Acad. Sci., April 1936.

3. Two papers on Fluctuations and Cycles of Nitrogen in Soils were read before the sessions of the Third International Congress of Soil Science, 1935, held at Oxford. These were published in the proceedings of the Congress.

III—Teaching.

The teaching of Chemistry at the Poona Agricultural College was in my charge. In this I was helped by the Assistant Professor of Chemistry and the Lecturer in Chemistry. The teaching of Geology which was done under the Agricultural Chemist so far has now been transferred to the Agricultural section.

In this section it is a long standing practice to train post-graduate students and I am recognised by the Bombay University as a University teacher in the Biochemistry for the M.Sc., M.Ag. and Ph.D. degrees of the Bombay University. In the year under report, there were three students for the M.Sc. degree and one for the Ph.D. degree. One of the M.Sc. students will send his thesis before long. Another will be ready by June 1937.

IV—General.

Assistants from the Chemistry section were sent to the Agricultural Shows to demonstrate the process of vinegar-making and distillation of essential oils. An easy method of crushing bones by half charring was demonstrated at a number of places. In the southern Division it was demonstrated at 16 places.

Staff.—I was on leave from the beginning of the year to the 16th of December 1935, when Professor N. Narayana acted as Agricultural Chemist. During this period Dr. V. N. Gokhale acted as Assistant Professor of Chemistry. Professor N. Narayana went on leave from 14th April to the end of May 1936. During this period also Dr. Gokhale acted as Assistant Professor.

I am glad to say that all my assistants both from the teaching and analytical section as also my office clerk worked hard and sincerely and gave me their hearty co-operation.

A Retrospect.

I took charge of the post of the Agricultural Chemist in June 1919 and I am due to retire on the 1st of September 1936. This is my last annual report and it would not be quite out of place, if I mention some of the important work done during the period I held charge of the office of the Agricultural Chemist.

Problems.—Some of the problems that were studied and investigated include, (1) The Red Rot of Sugarcane at Amalsad, (2) Katte disease of cardamoms, (3) Die-back disease of citrus plants, (4) Nitrogen Recuperation of soils, (5) Nitrogen fixation by rice soils, (6) Chemical changes during germination and formation of seeds, (7) Movements of manures in soils, (8) Decomposition of oil-cakes in soils, (9) Disintegration of bones, (10) Digestibility of old and new rice and (11) Compost making.

Enquiries.—Special enquiries were made into, (1) the oil-crushing industry and (2) the consumption of Gul and Sugar. The first was done by me as a member of the Fertilizers' Committee of the Imperial Council of Agricultural Research.

Collation.—The chief collation work was about the manurial experiments from 1896 to 1931.

Fundamental Information.—When any problem is to be studied some ground work is necessary. From that point of view information about the chemical composition etc., of the various materials connected with agriculture was put together and published in the form of Departmental Bulletins. They include, (1) Soils, (2) Manures, (3) Food grains, fruits and vegetables and (4) Cattle feeds etc.

Post-graduate teaching.—As a University teacher for post-graduate studies in Biochemistry for the M.Ag., M.Sc. and Ph.D. degrees of the Bombay University I trained more than a dozen men. So far all those that sent theses from this laboratory got the degrees. Eight M.Ags.

and six M.Scs. have been sent out. There are three students for the M.Sc. degree and one for Ph.D. degree studying in the laboratory at present.

Publications.—About three dozen papers were published during my regime—a large number of them are of first class type, since they were published either as Memoirs or as articles in the Indian Journal of Agricultural Science.

Water-finder.—This work was developed by me as a special feature. The water-finder machine was there and tests were taken for underground water before I came in possession of this work, but I studied the subject from various points of view and slowly developed the section to grow from one into four machines with four assistants. It soon became popular and had as many as 400 tests in the year in which the whole water finding work was closed. We were able to predict acurately both the depth and the quantity of water available and our successes were over 90 per cent. Over a dozen men were trained by me in water finding and some of them are carrying on the work with success.

D. L. SAHASRABUDHE,
Agricultural Chemist to Government,
Bombay Presidency, Poona.

Programme of Work for 1936–37.

1. Studies in the ripening of fruits.
2. Studies in the respiration of fruits during storage.
3. A study of the intake and outgo of plant constituents by crops.

D. L. SAHASRABUDHE,
Agricultral Chemist to Government,
Bombay Presidency, Poona.

ABSTRACT.

'Nitrogen Recuperation in the Soils of the Bombay Presidency,' Part IV, by Rao Bahadur D. L. Sahasrabuddhe and V.S. Abhyankar.

Indian Journal of Agricultural Science, Volume VI,
Part II, April 1936.

Field experiments were arranged to study the nitrogen recuperation which takes place in soils growing, (1) rain crops, (2) heavy rainfall crops

and (3) irrigation crops. For comparative results both uncropped and cropped plots were studied. Twleve soil samples were taken from each plot every month for 13 months and nitrogen in various forms was determined. The results obtained show that there are nitrogen fluctuations from month to month and there is an annual cycle of fluctuations for all soils. The highest total nitrogen is found in the cold season and at the beginning of rains while the lowest figures are found in the middle of rains and in the hot season. The larger the organic matter the greater is the nitrogen in the soil. Organic matter added as manure or as residues or crops, help in fixing nitrogen. The fluctuations in total nitrogen depend at least partially on the proportion of lime and phosphoric acid in the soils. Nitric Nitrogen is high in the cold season and low in the rains. Cropped plot contains less nitric nitrogen and the uncropped plot.

D. L. SAHASRABUDDHE.

ABSTRACT.

'Fixation of Nitrogen by Rice Soils and Rice Plants' by Rao Bahadur D. L. Sahasrabuddhe.

Proceedings of the Indian Academy of Science, Volume III, No. 4, April 1936.

It was observed in the previous experiments done in connection with the Nitrogen Recuperation in Soils that the cropped rice plot shows more nitrogen than the uncropped rice plot during the growing period of the rice crop. These results have been confirmed by field experiments in the winter season at Karjat and Ratnagiri and in the rainy season at Karjat.

These results received further confirmation by the experiments done in the laboratory which show that the rice soils have the power of fixing nitrogen and this fixation is helped by the presence of the growing roots of the rice plant. It has been shown that the rice seed does not carry within it any nitrogen fixing organisms.

D. L. SAHASRABUDDHE.

APPENDIX I.

Summary of Work done under the Economic Botanist to Government of Bombay for the year 1935-36.

Professor L. S. S. Kumar officiated as Economic Botanist to the Government of Bombay, Poona, until he was confirmed in the same post with effect from 17th April 1935. He was on leave on medical certificate from 16th September 1935 to 10th January 1936. During the absence on leave of Professor Kumar, Mr. V. M. Chavan, Assistant Professor of Botany, officiated as Economic Botanist, from 12th November 1935 to 10th January 1936. Mr. S. R. Godbole officiated as Assistant Professor of Botany from 14th November 1935 to 10th January 1936 in place of Mr. Chavan.

Mr. V. M. Chavan was confirmed in the post of Assistant Professor of Botany with effect from 17th April 1935.

Mr. W. V. Joshi was on leave from 14th April to 10th January 1936.

Mr. N. M. Patel continued to hold the post of the Linseed Breeder.

Grass Research.

Rotational Grazing.—The rotational grazing experiment at Mangadara Kuran for the year commenced on the 16th of August 1935, with only 110 animals. In the beginning the season was unfavourable for want of rains, and the number of animals available for grazing was rather low but during the last week of August there were some showers which encouraged the cultivators to send their animals and the number rapidly increased to 235. Some late showers during August and heavy rain in the middle of September improved the situation a good deal helping the grazing programme to be carried out smoothly.

Yield of Grass.—The yield of grass from 20 old and 20 new representative random quadrats 10′ × 10′ each, cut from the blocks each time the shift was made, indicates a slight increase in the total yield of grass in some of the blocks.

Effect of grazing alone on the live weight of animals.—As in the previous year a herd of 10 adult animals was weighed three times during the experiment, viz., at the beginning, middle and at the end. The result shows that there was an increase in live weight by 43 lbs. or 9·6 per cent. by the end of December 1935 and an average loss of 30 lbs. or 5·38 per cent. by the end of February 1936. For the third year in succession the increase in live weight of animals followed by a decrease has been observed to correspond with the freshness of the vegetation up to December and its drying up subsequently.

Study of Andropogon Contortus.—The study of the marked areas of *Andropogon contortus* (spear grass) was continued in each of the four blocks and there is a clear indication that perennial grasses are gradually ousting the spear grass.

Land development in the grazing area.—The maintaining of the old bunds in good condition and increasing the height of some to about a foot, was all that could be done during the year. There was good silting at the bunds and the stand of vegetation at these places is promising.

Clearing of shrubs.—Shrubs from four more large quadrats 100′ × 100′ were cleared off of their lower branches and the grasses under them were cut and weighed. The wastage in semi-dry grass is on average 0·62 lbs. under each shrub.

Grazing experiment at the Gilligan Cattle Breeding Farm, Pimple, near Jalgaon, East Khandesh.—In accordance with the wishes of the Deputy Director of Agriculture, North Central Division, Nasik, rotational grazing and the carrying capacity experiments have been started at the above farm. In the rotational grazing experiment an area of 60 acres has been divided into four blocks and one block is reserved for cutting grass after reseeding. 35 animals were admitted for grazing from the 13th August 1935. In the carrying capacity experiment, an area of eight acres is divided into four blocks and a herd of 12 animals is grazed in rotation. Four sets of quadrats corresponding to the four blocks are marked out and the grasses from these are cut at the time of each shift. This is meant to ascertain the quantity of grass consumed by animals during the period they graze in a particular block.

This experiment is to be continued for some more years.

Proposed grazing experiment at Chinchola Grass Area in charge of Nasik Panjrapole.—At the request of the Deputy Director of Agriculture, North Central Division, Nasik, a survey of the grass vegetation at the Chinchola Kuran has been made, with a view to start rotational grazing experiment.

Striga Research.

Preliminary investigations into the factors influencing the germination of *Striga* seeds have been completed and much of the present work is mainly restricted to the selection of Striga-resistant *jowars*. The inclusion of all the important varieties of *jowars* from Gujerath, North Central, South Central and Southern Divisions has increased the number of varieties under selection for resistance to *Striga* from four in 1933 to 15 in 1935. Of the selected striga-resistant *jowars* seven are in their first generation after selection (S_1) and 22 in second generation (S_2). These selected lines are being further selfed in order to make them pure for the resistance character.

Seeds of *Striga densiflora* collected during 1934, in large quantity from several different places has totally failed to germinate even after a continuous test for over eighteen months. The seed of the same species collected during the season of 1935, has also failed to germinate although care was taken in collecting only the mature seeds from ripe capsules. It is difficult to account for the failure in germination of seeds of

S. densiflora collected during 1934 and 1935, while the seeds of *S. lutea* and *S. euphrasioides*, collected at the same time, however, have germinated satisfactorily.

Orobanche research.

The work on the selection of *Orobanche*-resistant plants from the different commercial varieties of tobacco under field and laboratory tests was continued. Out of these varieties, six have yielded plants resistant to *Orobanche*. Some of these selected plants are in their first (S_1) and second (S_2) generation after selection. Further efforts to select resistant plants from the remaining eight susceptible types will be made. It is proposed to determine to what extent these selected lines have become pure for the resistance character on the same lines as it will be determined for *Striga* on *jowar*.

Histological study of the formation of haustoria of *Orobanche* will be taken up as a new item. Some cultural experiments to determine the nutritive requirements of the parasite compared with that of the host will also be undertaken during the coming year.

Linseed Breeding.

This is the second year of the Linseed Breeding Scheme financed by the Sir Sassoon David Trust Fund. During the year under report further selection work in the improvement of linseed was carried out at Poona and Indi in the Bijapur District.

Selection work.—295 individual plant selections made in the previous year were grown in plant-to-row cultures at Poona for further selection for the desired economic characters. From these single plant cultures nearly 194 individual plants have been selected on the basis of higher yield. The yield of the selected plants range from 10 to 31 grammes. These single plant selections were tested for their oil content and quality of oil in the laboratory and it is observed that majority of the cultures have maintained their high oil content and the drying quality of the oil. There is a general reduction of 3 per cent. in the oil content of the selected plants as compared with the previous year. The highest oil percentage in the current year's selection is 47 against 49 of previous year and the maximum iodine absorption number is 204 against 222 of last year.

Other selections based on the morphological differences of the plant have also been made and those which are economically useful will be finally retained. Selections from the freshly collected district samples and also trade samples have been made.

Nearly 40 single plant selection have been made from the district samples grown at Indi. The highest oil percentage of these selections is 46 and the maximum iodine absorption number is 222 (Hanus).

Non-Presidency pure types.—At present there are 22 non-Presidency pure types obtained from linseed-growing provinces of India and are being maintained pure. Material from the main linseed-growing countries

of the world is being collected so as to exploit and utilise these resources for the improvement of the local material by hybridization.

Yield trial.—In the yield trials conducted between the Presidency samples and non-Presidency pure types, both at Poona and Indi, the results significantly show that with the exception of the strains from the Central Provinces and six Peninsular types from Pusa, none of the outside pure types equal the local material in yielding capacity. However, the non-Presidency material possesses other desirable economic characters which would be valuable for hybridization. None of the Presidency samples has a white seed or a white flower which many of the non-Presidency pure types possess.

The results of yield trial are in conformity with those of last year.

Plant Introduction and Plant Improvement.

Acclamatization of Australian grass.—A fresh stock of the seeds was procured from Australia and was tried during the last season. Out of the 13 species tried, four did not germinate at all, six flourished well and three died before producing flowers. The six successful species will be tried on a larger scale during the coming year.

Weed Killing.—The experiment on eradication of weeds by the use of sodium chlorate as weed killer was continued. The herbicide was applied in doses of different strengths and it was observed that 1·5 per cent. solution of sodium chlorate with one application, could kill all the non-grass weeds.

Classification of Tur and Groundnut.—The work of recording morphological characters was continued. The types are more or less pure for the different morphological characters. This work will be continued for one more year when the classification work will be taken up.

Vernalization.—The experiments on vernalization (pretreatment) of seeds to induce early maturity and increase in yield was repeated for the second year in succession. During the year under report, attempts were made (1) to repeat a few of the outstanding treatments of the previous year so as to obtain the same results, (2) to observe the cumulative effect, if any, by repeating the self-same treatment on the progeny of plants similarly treated in the previous year, (3) to ascertain the residual effect, if any, on the progeny of plants treated the previous year without any further treatment, and (4) to devise new methods of vernalizing the crops.

Seeds of *bajri*, groundnut, *jowar*, wheat, rice and cotton were vernalized and tested as stated in the previous paragraph. Of these the first three were vernalized at Poona and grown at Poona, while the last three were vernalized at Poona and were grown at Niphad, Surat and Karjat, respectively. The following is the summary of results for each crop :—

Bajri.—The treatments failed to give any results in the desired form.

Groundnut.—The results of four treatments were in corroboration of those of the previous year. Cumulative and residual effect on earliness was slight and negligible.

Jowar.—The results of the previous year were not corroborated except in one case. There is, however, some indication that if the treatments were continued for successive generations it would produce some desirable cumulative effect.

Wheat.—Experiments were vitiated due to poor stand of the crop as compared with the control. The poor stand is attributed to the excessive development of radicles during vernalization. Some of the treatments have resulted in a slight earliness not exceeding three days but this earliness is not very useful. In point of grain yield the results indicate a failure.

Cotton.—Two years' experiment indicates that germination percentage of treated and untreated seed is about the same. There is a visible acceleration in the growth of the treated plants as compared with the controls but earliness in the setting of bolls is not induced. Whether this is due to the damage of early formed bolls by the boll-worm is difficult to state. There is some increase in yield from selected plants and residual effect is slight. Experiments are being continued.

Rice.—Results are quite discouraging. No further experiments will be done on this crop.

Experiments on X'raying.—Tobacco and mustard seeds were irradiated at the Sassoon Hospital, Poona, with the assistance of the Radiologist. The treatment on tobacco seed resulted in a failure to produce mutants.

In the dry X'rayed tobacco seed, the X_2 generation showed early flowering and a general weakening of the plants.

The experiments on X'raying mustard seeds, were vitiated by an attack of damping off which damaged completely the treated as well as the untreated controls.

East African Jowars.—Repetition of trials on 33 promising types of *jowars* confirmed the results of the previous year, viz., that none of the types is suitable for purpose of grain but most of them are good fodder-producing types. Some of these types will be maintained for teaching work.

African bajri.—Trials on the African bajri obtained from Jamnagar were made in replicated series. The value of the African bajri as compared with Type 54 is very doubtful. In one case when the crop was sown at the usual season, the African bajri was distinctly inferior both in the production of grain and fodder. In the trial made much later in the season it resulted in a significant superiority of the African bajri as compared with Type 54, probably because, the control could not stand the conditions of the abnormally late season.

Trials will again be made with this bajri on a more elaborate scale in the next year.

Teaching.

The Economic Botanist to Government was assisted by the Assistant Professor of Botany and Demonstrator in Botany in teaching general and agricultural botany to first and second year classes of the college.

The final batch of students who had elected Advanced Plant Breeding as their optional subject was trained during the year and out of a class of seven who appeared for the University examination in that subject six were successful. Henceforth courses in plant physiology, genetics and cytology becomes compulsory to all students under the revised syllabus of the B.Sc. (Agri.) course.

Seed testing.

187 seed samples were tested and reported on during the year as compared with 179 in the previous year. Seeds of some varieties of Indian vegetables have been added to the list of grass seed for determining their longevity.

Herbarium.

The Herbarium of the Economic Botanist's section contains some of the most valuable and historic collections of Dr. T. Cook which dates back to 1880. Due to constant use many of the specimens from this valuable collection are gradually falling to bits and unless some grant is made available for collecting and preparing a duplicate set for routine use, there is a danger of Dr. Cook's collection becoming lost after some years. There is a much felt want for increasing the collection of the flowering plants of the Bombay Presidency, and replacing old and worn out specimens by new ones. For many years past the herbarium has not received sufficient attention for better equipment owing to financial stringency but the time has come when something should be done to improve its present condition.

It is proposed to bring out a catalogue of the complete collection of specimens included in the herbarium as a Departmental Bulletin.

Miscellaneous.

Replying to enquiries of economic importance, identification of plant specimens and supply of seed of economic crops to places in and out of India form part of the Economic Botanist's work. This year 327 plant specimens as against 226 in previous year were identified. The economic enquiries dealt with were 45.

Preparing specimens of Cowpea for Kew.—Different varieties of cowpea seeds from the Presidency were collected and grown in Economic Botanist's area. Their morphological characters were recorded and specimens for Kew herbarium were prepared and despatched through the Secretary, Imperial Council of Agricultural Research.

Economic Botanist's area.—The land continues to be improved. It is used for growing specimens for teaching and research. The land is found quite insufficient for the routine purposes and every year more land is obtained from the Professor of Agriculture for carrying on field experiments.

Publications.

Patel, N. M.—Technological Aid in Crop Breeding, Poona Agricultural College Magazine, Vol. 27, No. 3, December 1935.

The article summarises in general terms how the findings in textile, food and oil technology have been utilized in crop breeding for the improvement of fibre crops, cereals and oilseeds respectively in Russia and America and indicates their adoption for improving the crops of Bombay Presidency.

L. S. S. KUMAR,
Economic Botanist to Government of Bombay, Poona.

College of Agriculture,
Poona, 24th July 1936.

Programme of Work under the Economic Botanist to Government of Bombay, Poona, for the year 1936-37.

1. *Grass experiment.*—(*a*) Rotational grazing experiments at Mangadara Kuran, Diva Ghat and (*b*) Gilligan Cattle Breeding Farm, Pimple, Jalgaon Taluka, to continue, (*c*) Grazing experiments to be started on Nasik Panjrapole's Kuran at Chinchola and the Forest Kuran at Pimple, Sinnar Taluka, provided the required facilities are made available.

2. *Striga on jowar.*—Selection and purification of resistant material obtained from Presidency types. Cross inoculation experiments on *Striga*-resistant Sorghums obtained from Dr. Saunders of South Africa.

3. *Orobanche on tobacco.*—Selection and purification of the resistant material of previous year. Histological study of the formation of haustoria and cultural experiment on nutrition of the parasite.

4. *Linseed breeding.*—Further selection and purification of material under study. Growing of foreign varieties of linseed for use as parents for hybridization.

5. *Vernalization.*—Further trials on cotton, jowar, groundnut and wheat to be undertaken.

6. *X'raying.*—Experiments to continue.

7. *Seed testing.*—Longevity tests on grass and vegetable seeds to continue.

L. S. S. KUMAR,
Economic Botanist to Government of Bombay, Poona.

APPENDIX J.

Summary of work done under the Crop Botanist to Government of Bombay, Karjat (Kolaba) for the year 1935–36.

Administration.

During the year under report Mr. B. S. Kadam held charge of the post of the Crop Botanist to Government of Bombay.

Mr. V. K. Patankar continued Superintendent, Rice Breeding Station, Karjat.

Messrs. R. K. Kulkarni and S. M. Patel continued to hold the posts of the Superintendent and Bajari Breeder respectively at the Cereal Breeding Station, Kundewadi, Niphad.

Rice Breeding.

Synthetic material.

(*i*) *K* 42 × *Krishnasal.*—The culture, Kr 42–81–13–1, was rejected as it was coarse in grain. Another culture from a duplicate cross has been isolated for further testing.

(*ii*) *K*42 × *K*226, *K*42 × *B*52 *and* *K*226 × *B*52.—Out of the three crosses the cross K226 × B52 was dropped as no satisfactory material was obtained. From the other two crosses desirable selections were obtained which will be put into row trials next year.

(*iii*) *K*42 × *K*414 *and* *K*226 × *K*414.—Cultures from the two crosses are being purified, and will be put in row replications next year.

(*iv*) *K*39 × *K*164.—From the heterozygous culture known as "K401" some early fine selections were grown during the year. Out of the three selections one appears promising and will be grown further.

Eleven families of K501, consisting 300 cultures, were grown for purification. Out of these, only one family, K501-104, did not show any late flowering and coarse grained plant. This family will be continued further for purification.

(*v*) *B*211 × *Sabour No.* 2.—The cross was grown in the F_3 generation. Unfortunately all the cultures showed a very wide range of segregation. and the whole material was discarded. However all the seed of a very desirable F_2 plant, combining high tillering and Bhadas type of grain, was grown. Out of the 825 plants in F_3 of this culture 47 desirable plants have been selected for further study.

(*vi*) *P*6 × *K*79.—The cross was grown in the F_5 generation. The promising selections will be tested next year.

Selection Material.

(*i*) *Selection in Zinya.*—Out of the 28 selections only two were continued for further trials, as these proved superior in yields as well as finer than the local Zinya. The strains Z149 and Z242 were compared with Zinya local and with late Kolamba K226 in eight replications in small plots. The strains show significant differences, but none of them exceeds the general mean. The strain Z149 gives higher yield than any other.

Zinya strains were compared at three palces in Thana District. Out of the three, at Man and Chinchani, the strains do not show any significant differences, while at Nandore the strains differ in yield significantly, K226 topping the list. Although this is the first test the farmers have apprecaited Z149 for its quality. It is finer in grain, uniform in size and transluscency, and is quoted higher than the local, the difference being from 5 to 7 per cent.

The trials of Zinya strains will be continued. The promising selections from the second lot will be put in row replications.

(*ii*) *Selection in Bhadas.*—The 15 strains selected last year were replicated nine times in rows. The Karjat strain B52, and B79 from Ratnagiri, were used as checks. Six of the strains appear promising, and will be tested further.

In addition to these strains some promising synthetic strains will also be compared.

(*iii*) *Selections in Kada and Jirbuti.*—Out of 46 selections grown during the year 14 cultures in Kada appear promising. These have been retained for further comparison.

There were 121 families of Jirbuti, and of these, 43 appear promising and will be grown further.

Yield trials in Districts.

(*i*) *Gujarath Division.*—The strain K184 was tried in Kaira and Bulsar districts. At the former place due to deficiency of rains plots were irrigated once. The Kolamba strain has given much better yield. In Bulsar the strain has also done well. The trials will be continued.

The Strain K540 was found late by a fortnight and gave 50 pounds less than the local Sutarsal in Godhra Taluka. However, it has been appeciated for its finer quality of grain. The trials will be continued.

(*ii*) *North Central Division.*—The strain K540 has been rapidly spreading in the Thana District. Village trials were conducted at nine places during the year under report. At six places Dangarwel was used as a check and gave an average of 2,241 lbs. per acre, while the average yield of K540 was 2,361 lbs. The Kolamba strain was compared with Dodaki at two places and showed an average of 1,990 lbs. as against 1,872 lbs. per acre of the local. In the last trial K540 was compared with Patni and both yielded equal, the actual figures per acre being 2,190 lbs. and 2,187 lbs. respectively.

(*iii*) *South Central Division.*—The strain K540 was compared with Panwel and Waksal varieties in Khed and Chiplun Talukas of Ratnagiri District. On the gravelly loam soil it has given an average of 1,391 lbs. as against 1,289 lbs. per acre of locals. The Kolamba strain being much finer fetches 55 to 60 Rs. per candy (1,280 lbs.) while locals, which are coarse grained, are priced 35 to 40 Rs. per candy. The trials will be continued.

Seed distribution.

Altogether over 1,000 lbs. of seed of various improved strains was supplied to the Deputy Directors of Agriculture for district trials and multiplication in their divisions.

VAL BREEDING.

Selection material.

(*i*) *Old selections.*—The yield trials were repeated again during the year. There were two sets of trials. In one set the experiment was vitiated by the yellowing of the crop in patches. The selections K.R. 35, Y14, K.R. 37, appear promising. The trials will be continued. From the second set two cultures appear promising. These will be tested on a large scale next year.

(*ii*) *New Selections.*—Promising selections from the bulk samples obtained last year will be grown further.

Hybridization.

The F2 generations of crosses of local types with a Madras type with white seed coat were grown during the year. Promising white grained types will be grown further.

BAJRI BREEDING.

Botanical analysis of bajri strains.

During the year under report the method of comparing the Poona strain 57, 39 and 54 with the local and Akola was changed as it was found that soil factors greatly interfered precluding fair comparison. The experiment was laid out in a Latin Square. Plots of 6′×6′ were marked out in the centre of the larger plots of the Latin Square in the beginning, and the whole population in the area studied. The data were analysed by the method of analysis of variance.

The results indicate that (1) Akola and Local are significantly superior in field germination to Poona strains. The germination of the former two was 73·47 to 76·80 per cent. as against 57·63 to 63·66 of Poona strains. (2) All the types show more or less the same morphological composition as to sheath and plant hairiness. (3) The Poona strains

showed chlorophyll deficiencies while Akola and Local were free. (4) Akola was significantly late to all the Poona strains, but significantly earlier to Niphad local. Within the Poona strains, 37 was significantly late. (5) Niphad local had the highest number of nodes, and both Niphad and Akola differed significantly from Poona strains. (6) Niphad local was significantly late than the others. With respect to characters, (7) length of earheads, (8) thickness of earhead, (9) yield of grain, (10) yield of straw and (11) number of grains per gramme. The results indicate that the individual plants of the various strains do not differ significantly from each other.

The botanical analysis of the Poona strains and of Akola and Niphad bajaris has been conducted for three years. The results of these years indicate that as a population the Akola variety has the advantage over the Poona strains in (1) better field germination, (2) lateness, (3) Higher number of nodes, (4) a well filled earhead, (5) a larger size of grain and (6) a much better crop stand.

The experiment will be discontinued.

Study of crop stand in Poona strain 59.

The strain 59 was compared ten times with Akola by the ABBA method. The results indicate that Akola had a significantly higher germination than the strain 59, the percentages being 63·28 and 52·87 respectively. The percentage of mortality in Akola was 23 per cent., while 59 showed 29 per cent.; the difference, however, is not significant. In grain and fodder, however, Akola out yields 59 significantly, the yield per acre being 758 lbs. as against 553 lbs. of the Poona strain. The seed of Akola sown was actually smaller than 59, the difference being real. But the produce shows that the Akola has larger sized grain than 59 which is significantly inferior.

There are definite indications that plant mortality is greatly influenced by climatic conditions especially by rainfall. The experiment will be discontinued.

Yield trials of African bajari.

The African bajari was compared with local by the ABBA method on plots of one guntha replicated 10 times. The seed rate and method of sowing were according to local practice. The stand of the crop was imposing and it was expected that the African bajari would give considerable higher yield. The ear-heads were from 1 to 2 feet in length. The actual results, however, were contrary to expectation as the African bajari gave 26 per cent. less grain and 24 per cent. less fodder but 56 per cent. more chalf than the local bajari. The yield of grain per acre of African and local was 633 lbs. and 858 lbs. respectively and the yield of fodder was 1,452 lbs. and 1,904 lbs. respectively. The differences in all cases are significant. The African bajari suffered from two drawbacks. It was sown thick, consequently the ear-heads were not very long and the variety being late by 15 days to local suffered more due to want of late rains, resulting in poorly filled ear-heads.

The African bajari has a smaller and lighter grain than the local bajari. Its grain is yellowish while that of the local is greenish. The merchants are of opinion that the grain of the African bajari would not be preferred by the people due to its yellow colour and small size.

The experiment will be continued.

Wheat Breeding.

Synthetic material.

(*i*) *Bansi-Khapli and natural crosses.*—The two new strains, Bansipalli 900, evolved from K. K. 568 × Bansi 162, and B. G. 8–1, isolated from a natural cross in Bansipalli 809, were replicated five times with Bansipalli 808, Bansi 168 and Local Bansi on ¼ guntha plots. B. G. 8–1, white glumed and white awned like Bansipalli 808, has again given 11 per cent. more grain and 17 per cent. more straw than Bansipalli 808. The differences are significant. Its grain, however, is not as lustrous and long as that of Bansipalli 808. It is late by 4 to 5 days.

The other strain, Bansipalli 900, is the earliest so far evolved, and in yield, unfortunately, is significantly low of all. It has however lustrous and long grains, and on account of its earliness may suit shallow soils. It has felted brown glumes and black awns.

The yield trials will be continued.

(*ii*) *Baxi-Khapli.*—Five easy shelling derivatives, namely 17–56–6, 17–56–45, 17–56–62, 17–56–63 and 17–56–112 from the cross between K. K. 568 × S. P. 33 were replicated six times with S. P. 33 and Pusa 4 as checks. The strain 17–56–63 has again yielded higher than S. P. 33 as in the last two years, but the difference is not significant. *It has however, a longer grain than Baxi with as good a lustre.* Strains 17–56–62 and 17–56–6, though slightly lower in yield, have also a better quality of grain than S. P. 33. These three strains are worth giving village trials in the proper tract of Nagar district. Pusa 4, in this experiment, yielded significantly low of all. The experiment will be continued.

Similarly, five hard shelling synthetic strains, viz., 17–5–136, 17–11–112, 20–7–115, 20–7–162 and 20–33–5 were compared with the hard shelling cultivated Khapli and Pusa 4. Again strain, 20–7–115 has given highest yield as in the past two seasons. It has a lustrous yellow grain and is less hard in shelling and *earlier by about a fortnight* than the ordinary Khapli wheat.

(*iii*) *Baxi-Bansipalli* 808.—Bansipalli 808 was crossed with S.P. 33 (Sheta Parner Baxi), with the object of improving the tillering capacity of Bansipalli 808 and lustre of grain. The cross was grown in the F_3 generation consisting 178 families. Twelve outstanding families have been selected for further purification.

(*iv*) *Bansipalli* × *Pusa* 4.—From the interspecific crosses valuable material has been obtained. During the year a culture was found which has very large grains and in general resembles *T. polinicum.*

(*v*) *Bansipalli* 808 × *Polish.*—A few crossed seeds were grown successfully during the Kharip season. It was therefore possible to grow both F_1 and F_2 generations during the regular season.

(*vi*) *Bansipalli* 808 × *Punjab.*—The Punjab is a high yielding durum wheat. Crosses were made last year and F_1 and F_2 generations raised during the year.

Black stem rust of wheat.

(*i*) *Differential hosts.*—Through the courtesy of Dr. Stakman of the University of Minnesota, St. Paul, Minnesota, U. S. America, seed of various differential hosts was obtained. These were grown throughout the year at an interval of one month to determine the best period of seed setting. Except enikorn all others set seed. The best period of setting was from September to November.

(*ii*) *Selection in Khapli wheat.*—Out of the five bulk samples received from the various parts of the Presidency 97 selections, made last year, were grown in cultures. These were found to differ in the capacity to germinate under field conditions, flowering and size of spikelets.

(*iii*) *Hybridization.*—Our best wheats have been crossed with the immune Russian wheats, *T. viticulosum* and *T. typicum* to create plant populations.

(*iv*) *Reaction of Bombay wheats to black stem rust.*—Under the auspices of the Imperial Council of Agricultural Research Dr. K. C. Mehta is conducting a survey of the prevalence of physiologic forms of black stem rust (*Puccinia graminis tritici*), of yellow rust, (*Puccinia glumarum tritici*) and of brown rust, (*Puccinia triticina*). Of these, the black stem rust is the most important disease in the Bombay Presidency. So far six forms of this stem rust have been found. These are XV, XL, XLII, LXXV, XXI, and XXIV. The last two have been very recently discovered.

In order to obtain information on the reaction to stem rust samples of various Bansi strains, Baxi, Khapli and the derivatives from various crosses were sent to Dr. Mehta for testing.

The results relate to only the first four forms of the rust. Bansi 168, Bansi 224 and Baxi are susceptible to all the four forms, XV, XL, XLII and LXXV. Khapli 568, which has been used extensively as one of the parents in hybridization with Bansi wheats, has, unfortunately, proved susceptible to forms XV; XL, and XLII. To the form XL it shows reactions from moderately resistant to moderately susceptible. It is resistant to form LXXV. Bansipalli 808 which was derived from the cross, Bansi 168 × K. K. 568, shows susceptibility to forms XV, XL, and XLII, but is resistant to form LXXV.

A number of derivatives from the cross Baxi × K. K. 568 showed susceptibility to the three forms, XV, XL and XLII, while nine out of the ten are resistant to form LXXV. Most of the isolates from this cross show varying behaviour within themselves to form XV, indicating

that segregation is still taking place as far as reaction to stem rust is concerned.

A bulk sample of Khapli was also sent. It shows susceptibility to form XLII. To forms LXXV and XV the reaction is from virtual immunity to moderate resistance. While to form XL the reaction is from virtual immunity to moderate susceptibility. It is thus evident that ordinary Khapli consists of bio-types which vary in their behaviour. This is of considerable importance in breeding of rust resistant wheats.

The wheat Pusa 4 was not sent for testing. But from the published reports of Dr. Mehta it appears that it is susceptible to all the four forms.

District trials.

(*i*) *Gujarath division.*—The Bansipalli 808 wheat was compared with the Bansi strain 224 and with local wheats in the Ahmednagar district. Bansipalli 808 yielded better over Bansi 224 and Local wheats. It is interesting to note that even under irrigated conditions Bansipalli 808 did very well. The Local wheats suffered heavily by rust than Bansipalli 808. It has been found that the new wheat is resistant only to form LXXV of the black stem and this may probably account for its comparative resistance.

The trials will be continued.

(*ii*) *North Central division.*—The village trials of Bansipalli 808 were conducted at seven places in the district of Nasik. Bansipalli 808 gave more yield at five places and is equal at two places. Its average yield is 438 lbs. as against 419 lbs. per acre of the local.

Bansipalli 808 is estimated to have spread to an extent of 2,000 acres in the Nasik district.

The district trials in the division will be discontinued.

(*iii*) *South Central division.*—The Bansipalli strains 808 and 809 and the Bansi strain 168 were compared with local wheats in the Ahmednagar district. Bansipalli 808 has done better in the Shevgaon taluka, while 809 is the best in yield in the Parner taluka. Bansipalli 808, however, has been pronounced as the best strain as it is heavier in grain and better in colour and lustre. It was expected to bring Rs. 3 more per palla (240 lbs.).

The trials will be continued.

(*iv*) *Southern division.*—Village trials of Bansipalli 808 were conducted at seven places in the Belgaum, Dharwar and Bijapur districts of the Southern division. Bansipalli 808 has yielded better than local at all the places. The increases are considerable, the average increase is 38·79 per cent. The trials will be continued.

Multiplication of seed.

Seed of improved strains of wheat, Bansi 168 and 224 and Bansipalli 808 and 809, was supplied to the various Deputy Directors for village trials

and for further multiplication in their divisions. Altogether 3,400 lbs. of seed was distributed.

Gram Breeding.

Selections.

Preliminary yield trials in rows were conducted during the year. Three yellow and one brown grained early types are better than local, giving 5 to 12 per cent. more yield. The trials will be continued on large scale.

Study of flowering in gram.—The study of flowering in early and late types has been completed. The results are being written up for publication. It is found that most of the flower buds open and close on the successive days. Very few open on the third day. Some flowers open and close the first day only. No cleistogamous flowers were observed. Anthesis takes place in the bud stage.

The sequence of opening of flowers is regular. Flowering in gram continues for about a month. Early formed flowers result in larger number of pods, the amount decreasing with late flowering. Thus early types are higher yielding, setting nearly 50 per cent. pods, as against only about 30 per cent. of the late types.

Co-operative Studies.

(*i*) *Wheat rust.*—Stationary slide exposures were made throughout the season. The exposed slides were sent to Dr. K. C. Mehta, Agra.

(*ii*) *Agricultural Meteorological observations.*—Precision experiments were continued and the results were supplied to the Agricultural Meteorologist, Poona.

(*iii*) *Vernalization.*—Vernalized seed of rice and wheat from the Economic Botanist to Government, Poona, was grown for him at the Rice Breeding Station, Karjat, and at the Cereal Breeding Station, Niphad. The results were supplied to the Economic Botanist, Poona.

(*iv*) *Physical analysis of Rice and Paddy.*—Hundred and three rice samples and 51 of paddy received from the Assistant Marketing Officer, Poona, were analysed. The results were supplied to the Agricultural Marketing Adviser, Delhi.

PUBLICATIONS.

Kadam, B. S. (1935).—Inheritance of root colour in rice. *Journ. Indian Bot. Soc.*, XIV, (2) : 173–178.

Kadam, B. S., G. G. Patil and V. K. Patankar (1936).—Double awned spikelets in rice. *Current Science*, IV, (10) : 739.

Kadam, B. S. (1936).—Science Notes (Bansipalli 808), *Current Science*, IV, (11) : 833.

Kulkarni, R. K. (1935).—Cross-fertilization in Maldandi Jowar. *Poona Agricultural College Magazine*, XXVII, (2) : 72–78.

B. S. KADAM,

July 1936. Crop Botanist to Government of Bombay, Karjat.

Abstract of publications contributed by the section of the Crop Botanist to the Government of Bombay, Karjat, during the year 1935–36.

Kadam, B. S. (1935).—Inheritance of root colour in rice. *Journ. Indian Bot. Soc.*, XIV, (2), 173–178.

A detailed account of the inheritance of root colour in rice is given. A Burmese variety develops anthocyan on roots when exposed to sunlight. It was crossed with a variety with colourless roots. The character of colour on roots is dominant, segregating 9 coloured roots : 7 colourless in F_2. The behaviour was confirmed in F_3. The root-colour gene is designated R_0, which in the presence of A, general anthocyanin gene, produces coloured roots.

Kadam, B. S. (1936).—Science Notes (Bansipalli 808). *Current Science*, IV, (11), 833.

The Bansipalli 808 wheat was evolved from a cross between a synthetic Khapli and the improved Bansi strain 168. The strain is earlier by a fortnight to the local and is better yielding. The grain is bigger, and attractive in colour and therefore fetches higher prices than the local. It is now spreading in the Nasik district.

Kadam, B. S., G. G. Patil and V. K. Patankar (1936).—Double awned spikelets in rice. *Current Science*, IV, (10), 739.

In the F_3 generation of the cross between the Karjat Wild rice and a Burmese variety, *Paungbalaung 3*, a family showed plants bearing some spikelets with awnes on both lemma and palea. There were 19 such plants out of 39. Further studies are in progress.

Kulkarni R. K. (1935).—Cross-fertilization in Maldandi *Jowar. Poona Agricultural College Magazine*, XXVII, (2), 72–78.

The extent of vicinism was irregular, ranging from 0 to 12·3 per cent. in different rows. The average was nearly 3 per cent. Contamination was found to be as far away as 40 feet. Bagging of the plants is considered essential and the strains under multiplication should be sown at least 40 feet away.

Programme of Work under the Crop Botanist to Government of Bombay-Karjat, Kolaba, for the year 1936-37.

RICE BREEDING.

I. Yield trials of synthetic strains from :—
(1) *K42* × *Krishnasal*, (2) *K42* × *K226*, (3) *K42* × *B52*, (4) *K42* × *K414*, (5) *K226* × *K414*, (6) *P6* × *K79*.

II. Purification of K501.

III. Yield trials of selections from :—
(1) Zinya, (2) Bhadas, (3) Kada, and (4) Jirbuti.

IV. Trials in South Central Division and Gujarath Division.

VAL BREEDING.

I. Yield trials of :—
(1) Old-selections, (2) new selections.

II. Selections from hybridized material.

BAJARI BREEDING.

I. Further in-breeding and selection from in-bred material.

II. Comparison of African bajari with Akola bajari.

WHEAT BREEDING.

I. Yield trials of strains from (1) Baxi × Khapli and natural crosses and (2) Baxi × Khapli cross.

II. Selections from (1) Baxi-Bansipalli, (2) Bansipalli × Pusa 4, (3) Bansipalli × Polish, (4) Bansipalli × Punjab.

III. Selections in Khapli and other rust work.

IV. Comparison of Bansipalli 808 sown at different periods.

V. District trials in South Central Division, Southern Division and in the Gujarath Division.

GRAM BREEDING.

I. Row trials of selections.

B. S. KADAM,
Crop Botanist to Government of Bombay,
Karjat.

APPENDIX K.

Summary of Work done under the Plant Pathologist to Government, Bombay Presidency, Poona, for the year 1935-36.

Dr. B. N. Uppal held charge of the section throughout the year.

The headquarters of the Betelvine Investigator, Mr. J. S. Malelu, were transferred to Palghar. The period of the temporary scheme for the investigation of betelvine wilt ended on the 31st October 1935, and Mr. J. S. Malelu reverted to his substantive grade in the cadre but continued to work as Betelvine Investigator.

Mr. N. T. Kulkarni continued to work as Sann Investigator on the Sann Wilt Scheme financed from the funds of the Sir Sassoon David Trust.

Mr. Y. S. Kulkarni and Mr. J. D. Ranadive, Pathological Assistants on the Cotton Wilt Breeding Scheme financed by the Indian Central Cotton Committee, joined their duties at Poona in June 1935.

Mr. B. S. Varad Rajan, who was appointed Research Assistant for black rust survey in the Bombay Presidency for a period of three years, joined his duties on the 16th August 1935.

The Government have sanctioned a temporary post of Assistant Plant Pathologist in the Bombay Agricultural Service Class II, for the investigation of "Koleroga" of betelnuts.

Education.

The Plant Pathologist to the Government was assisted by the Assistant Professor of Mycology in the teaching of plant pathology and agricultural bacteriology at the College of Agriculture, Poona.

There were six students specialising in Advance Plant Pathology, and all of them were successful in the University examination held in March 1936. Two of these students were placed in the first class in the University examination, and one of them stood first and the other second in the whole examination.

At present there is one post-graduate student for the M.Ag. degree, and there is also one special student doing post-graduate research.

Research.

1. *Wilt in betelvines.*—The treated area at Bassein is gradually being extended. The number of applications of Bordeaux mixture at Mahim is more than the number required for effective control at Bassein. Arrangements are being made to set up a local organisation at Bassein for stocking copper sulphate and lime.

A study of the morphology and physiology of the fungus has been made.

It is proposed to write up the results for publication.

2. *Fusarium wilt in sann hemp.*—The seed of the homozygous wilt-resistant strain, D-IX, was multiplied during the year. One thousand seeds of this strain were sown in a bed completely covered with a muslin cage. After flowering had started, honey bees were let into the cage, but no capsules were formed. Later, bees belonging to the genus *Xylocopa* were introduced, and capsules were formed within a week, indicating that bees vary in their ability in effecting pollination. It was also observed that the efficiency of *Xylocopa* bees in effecting pollination was greatly increased by artificial spraying inside the cage resulting in the lowering of temperature.

It is proposed to study the relative efficiency of bees in effecting pollination, as this problem has a vital bearing on the multiplication of the seed of the resistant strain.

The seed of the resistant strain was sent to the Crop Botanist to the Government for multiplication at Karjat, since no sann hemp is grown at Karjat in the cold season and there is therefore no danger of cross pollination of the resistant strain with susceptible varieties. Karjat, however, proved an unsuitable place as the plants made poor growth and were attacked by insects.

A cross of the homozygous wilt-immune strain has been made with a homozygous susceptible strain. The F_1 will be tested during the next season.

The results on the causal organism of sann hemp wilt and on the isolation of a wilt-resistant strain are being written up for publication. A short note on the cross inoculation of sann hemp and pigeon pea was published in " Current Science ".

3. *Powdery mildew of betelvines.*—In the newly planted gardens one application of sulphur made in December at the rate of about 50 lb. per acre (calculated) controlled the mildew effectively. In old gardens, however, two applications were required to be made at an interval of 1½ months; the total dressing per acre was about 90 lb. The cost of treatment is from Rs. 6 to Rs. 8 per acre.

4. *Powdery mildew of the mango.*—Histological studies have shown that the fungus has globular haustoria and should therefore be referred to *Erysiphe polygoni* and not *Erysiphe cichoracearum* as was done by Wagle and Ajrekar.

5. *Powdery mildews.*—Several ectophytic mildews have been newly recorded in the Presidency; hosts of special interest are *Santalum album, Mirabilis jalapa, Abutilon indicum, Daemia extensa, Phaseolus mungo, Sesbania* sp., *Acalypha ciliata, Papaver somniferum.*

Endophytic mildews have also been recorded on several new hosts. Of special interest is *Cajanus indicus*, on which *Oidiopsis taurica* has been recorded apparently for the first time in India. This fungus has already been reported on pigeon pea from Ceylon and Tanganyika Territory, but there have been no further records.

6. *Downy mildew of Rumex.*—*Rumex* plants are susceptible to downy mildew at all stages of growth. Oospores are not formed under Bombay conditions. Cross inoculation tests were repeated during the year, and show that the fungus is highly specialised.

7. *Fig rust.*—Experiments on the control of fig rust were continued at Saswad during the year. The fungicides used were Bordeaux mixture 3–3–50 and Sulsol 2½ in 100 and 3 in 100; fish-oil rosin soap was also used in one plot to control jassid hoppers. The interval between applications was one month. Spraying was first given in November, the last application being in February.

Fig rust was fairly prevalent during the year. Both Bordeaux mixture and Sulsol controlled rust infection. Bordeaux mixture was, however, superior to Sulsol as it did not cause bronzing of leaves. The trees sprayed with Bordeaux mixture also had better foliage. Infection in neighbouring, untreated plots ranged up to 40 per cent.

Viable uredospores have been collected throughout the year, indicating that under the Deccan conditions the rust fungus perpetuates itself in the uredo-stage.

8. *N-fixation in rice fields.*—A bacterial organism has been isolated from rice fields at Karjat. The organism has been found to fix atmospheric nitrogen when grown in Ashby's solution, and there are definite indications that this activity is greatly stimulated in the presence of the rice plant.

The organism is of the non-symbiotic type and preliminary examination shows that it is probably an *Azotobacter*.

9. *Wilt in Lathyrus sativus.*—*Lathyrus sativus*, locally called *lang*, is an important cold season crop in Broach District and is subject to a severe wilt disease. Wilted plants were collected from widely separated localities in Broach District, and the following fungi have been isolated: *Fusarium*, *Neocosmospora* and *Rhizoctonia*. The pathogenicity of these organisms will be tested during the next season.

10. *Cotton Wilt Breeding Scheme.*—A new glasshouse has been built and the present soil temperature tank house has been extended.

(I) *Broach section.*—(*a*) *B. D. 8.* This work was started in 1932–33 at Broach. A large number of selections (furnished by the Breeder) were tested in pots, but only 22 plants (all showing discoloration of veins) survived. These were transplated in the field and selfed, but had to be ratooned as they were transplanted late. The seed was tested in pots in 1934–35. Of these, B. D. 8–6 and B. D. 8–26 remained free from wilt; the rest showed varying percentage of wilt infection.

The progeny of 4 plants of B. D. 8–6 and of 9 plants of B. D. 8–26 was tested in Poona in single pots (according to the new technique). Daily observations were made for a period of 45 days, and all plants that wilted were incubated to make sure that death was due to *Fusarium*. Out of a population of 710 plants tested, only 38 plants survived at the end of 45 days; 26 of these plants were absolutely free from any leaf mottling. These have all been transplanted in an infected

plot. The plants have made excellent growth although they were transplanted late in September.

The progenies of two more plants, B. D. 8–5, and B. D. 8–14, were tested in Poona, but they all succumbed to wilt.

Another lot of selfed seed of B. D. 8, which was first tested in 1933–34, was tested. All these plants also died.

The Cotton Breeder, Broach, has sent selfed seed of a large number of selections and crosses to be tested; these tests will be made during the coming season.

(*b*) *New Selection 12.*—Five strains of this selection were tested in 1933–34, and many plants survived and remained free from leaf mottling. The peculiarity of this selection is that it does not show vein discoloration but only a slight yellowing of a small portion of the cotyledons. Progenies of 3 strains were tested in 1935, and out of a total population of 1,000 plants only 51 plants (free from mottle) survived and were transplanted very late in the season. Twenty plants are likely to produce seed, the rest will be ratooned.

(II) *Jalgaon section.*—A number of N. V. selections were tested in pots, but all died of wilt.

Million Dollar, a strain of *Gossypium neglectum*, was tested in pots according to the new technique. Daily observations were made for a period of 45 days, and at the end of this period 72 plants survived out of a population of 104. The survivals were transplanted very late in the season, and out of these 17 died in the field, and in 8 cases death was due to *Fusarium vasinfectum*. The remaining 55 plants have produced a sufficient number of bolls. The progenies of these plants will be tested next year.

(III) *Surat section.*—A recent survey of Surat District has shown that wilt is widespread in this area. Since 1027 A.L.F. is generally susceptible to wilt, a scheme has been submitted to the Indian Central Cotton Committee for the production of a wilt-resistant strain suitable for the Surat area.

11. *Root rot of mosambi.*—This disease has assumed very serious proportions. Its symptoms were briefly discribed in the last year's report. Numerous isolations from roots of diseased plants have yielded a *Fusarium*, the pathogenicity of which will be tested in the coming season.

12. *Bombay Virus Scheme.*—This scheme has been revised, and funds are now forthcoming from the Imperial Council of Agricultural Research. However, before the experimental work is started, an insect-proof glasshouse has to be built.

It is proposed to undertake a study of a serious disease of cardamom, which has almost wiped out this important crop from the Kanara District; the disease appears to be of virus origin.

13. *Koleroga of betel nuts.*—The Imperial Council of Agricultural Research refused funds for this work on the grounds that this was mainly

a provincial scheme. However, the Government have now sanctioned the scheme in its original form for a period of five years. The object of the scheme is to clear up doubtful points in the life history of the causative fungus.

14. *Fruit rot of the mango.*—A species of *Phoma* has been isolated from black spots on the stem-end of ripe Alphonso mangoes. The pathogenicity of the fungus has been established on Alphonso fruits. Further work is in progress.

Advisory Work.

A large number of enquiries on plant diseases were dealt with during the year, and advice was given promptly whenever required.

Arrangements to demonstrate specimens of plant diseases and the appliances for their control were made as usual, at the agricultural shows in collaboration with the Divisional Deputy Directors of Agriculture.

The work on the disease survey of the Presidency was continued during the year.

Miscellaneous.

Necessary facilities were provided to Dr. K. C. Mehta for making stationary slide exposures at different stations in the Bombay Presidency, in connexion with his studies on the dissemination of wheat rusts in India.

As pointed out in the Annual Report for the year 1931–32, the recent survey has confirmed the earlier observation that black rust oversummers in suitable places in the Western ghats.

Publications.

(1) Uppal, B. N., N. M. Kamat and M. K. Patel.—A new variety of *Oidiopsis taurica*. Indian Jour. Agr. Sci. 6, 110–115. 1936.

(2) Uppal, B. N., and M. N. Kamat.—Gummosis of citrus in Bombay. Indian Jour. Agr. Sci. 6, 803–822. 1936.

(3) Uppal, B. N. and W. H. Weston, Jr.—The merging of *Sclerospora indica* with *Sclerospora philippinensis*. Indian Jour. Agr. Sci. 6, 715–719. 1936.

(4) Uppal, B. N. and N. T. Kulkarni.—Fusarium wilt in sann hemp. Current Science 4, 314–315. 1936.

(5) Uppal, B. N.—A serious disease of guava in Bombay. International Bull. Pl. Protect. 10, p. 99, 1936.

B. N. UPPAL,
Plant Pathologist to Government.

Programme of work under the Plant Pathologist to Government for the year 1936-37.

(1) *Wilt in betel vines.*—Work on the control of wilt at Kelva Mahim is being continued. Propaganda work at Bassein will be further extended.

(2) *Fusarium wilt in sann hemp.*—The relative efficiency of different bees in effecting pollination in sann hemp will be studied. The F_1 of the cross between the homozygous resistant and susceptible strains will be grown and studied as regards the inheritance of resistance. The selfed seed of the resistant strain will be multiplied at Poona before it is sent to Dharwar for further multiplication.

(3) *Powdery mildew of betel vines.*—Further work is required to be done to reduce the total dressing of sulphur per acre.

(4) *Powdery mildews.*—The collection and study of powdery mildews on new hosts will be continued.

(5) *Downy mildew of Rumex.*—The structural characteristics of the conidial stage will be further studied in detail.

(6) *Fig Rust.*—Extended trials with Bordeaux mixture will be continued.

(7) *N-fixation in rice fields.*—The study of the organism and the conditions under which it fixes nitrogen from the air will be made.

(8) *Wilt in Lathyrus sativus.*—The pathogenicity of the organisms isolated from wilted *lang* plants will be tested.

(9) *Cotton Wilt Breeding Scheme.*—(*a*) In the Broach section work on the production of homozygous wilt-resistant strains in B.D. 8 and N.S. 12 will be continued. (*b*) Similar work will be done for the Khandesh area. (*c*) Work will be done to determine the optimum range of soil temperature for the development of wilt in cotton.

(10) *Root rot of mosambi.*—The pathogenicity of the organism isolated will be tested.

(11) *Bombay Virus Scheme.*—It is proposed to build an insect-proof glasshouse.

(12) *Koleroga of betelnuts.*—The research on the life history and the alternate hosts of koleroga will be taken.

(13) *Fruit rot of the mango.*—The pathogenicity of *Phoma* sp. will be tested.

B. N. UPPAL,
Plant Pathologist to Government.

Abstract of papers published during 1935-36.

(1) UPPAL, B. N., M. N. KAMAT and M. K. PATEL.

A new variety of Oidiopsis taurica.—Indian Jour. Agric. Sci. 6, 110-115. 1936.

The abstract of this paper has already been given in the Annual Report for the year 1934-35.

(2) UPPAL, B. N. and M. N. KAMAT.

Gummosis of citrus in Bombay. Indian Jour. Agric. Sci. 6, No. 3. 1936.

The abstract of this paper has already been given in the Annual Report for the year 1934-35.

(3) UPPAL, B. N. and W. H. WESTON, Jr.

The merging of Sclerospora indica with Sclerospora philippinensis. Indian Jour. Agric. Sci. 6, No. 3. 1936.

The history of the fungus causing downy mildew of maize in India, which was first recognised by Butler as *Sclerospora maydis*, later renamed *Scl. indica*, has been reviewed. Significant structural details of the conidial phase of the fungus have been compared with those of *Scl. philippinensis* on maize in the Philippines. This comparative study has revealed that there is no adequate basis for maintaining *Sclerospora indica* and *Sclerospora philippinensis* as separate species, and the former has therefore been merged with the latter under the name *Sclerospora philippinensis* Weston.

(4) UPPAL, B. N. and N. T. KULKARNI.

Fusarium wilt in sann hemp. Current Science 4, 314-315. 1936.

This is a short note stating that *Fusarium vasinfectum* is restricted in its parasitism, and that the physiologic strain on sann hemp does not pass to pigeon pea and *vice versa*.

(5) UPPAL, B. N.

A serious disease of guava in Bombay. Internat. Bull. Plant Protect. 10, 99. 1936.

The symptoms of a serious disease of *Psidium guajava* found in Dholka in North Gujarat have been briefly described. The disease attacks the bark and infection spreads rapidly along the stem. The bark dries up, cracks and ultimately sheds resulting in the death of the affected branch. In course of time infection spreads to other branches, and the tree dies. Large number of perithecia of the causal fungus are found scattered over the dead bark.

The disease is caused by *Physalospora psidii* Stevens and Peirce, a fungus which has not yet been reported elsewhere in India.

B. N. UPPAL,
Plant Pathologist to Government.

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APPENDIX L.

Summary of work done under the Live Stock Expert and Provincial Marketing Officer for the year 1935–36.

Personnel.—Mr. Edw. J. Bruen, held charge of the Live Stock Section and also that of the Provincial Marketing Officer throughout the whole year.

The work done by the above Officer may be divided under the following headings :—

1. Live Stock, Breeding on farms and improvement in villages.
2. Provincial Marketing Survey.
3. Rural Up-lift work as far as Live Stock improvement is concerned.
4. Palghar Dairy District development.
5. Live Stock Research financed by the Imperial Council of Agricultural Research.

The progress made during the year under each of the above headings is being reported separately.

A very great demand for Pedigree bulls has been caused by His Excellency the Viceroy's appeal. The Live Stock Expert had to attend two meetings of the Imperial Council of Agricultural Research one in Delhi and one in Simla during the year.

The activities of this Section for convenience sake are divided up as follows :—

1. Advisory work.
2. Propaganda and teaching in villages.
3. The breeding of pure bred stock on Government and subsidised farms and private farms.
4. The breeding of improved poultry on Government and private farms.
5. The improvement of cattle in villages, by the introduction of good, pure bred bulls, the Registration of village cattle and the progeny of premium bulls.
6. The Improvement of the poultry industry in village, by replacing all country cocks by improved cocks bred on Government and well organised private farms.
7. The encouragement of breeding and rearing of good stock in villages holding annual shows and cattle ralleys.
8. The Improvement of the buffalo.
9. The Registration of all pure bred stock on private semi Government farms and in villages.

10. Propaganda in the storage of fodder in the form of silage and hay.
11. The better utilization of grass lands by introducing methods of grazing.

Advisory work.—The demand made on this section during the year has been very great owing to the Rural-Up-lift drive initiated by Government. It has been a very heavy year on all staff of this section.

Propaganda.—Our propaganda has now earned a demand which we cannot meet. Poultry, cattle, sheep and goat keeping has taken us all over the Presidency. The work on Live stock could easily be double to-day if more staff and finance were provided for the work that is now possible.

All those who have seen the results of our work in the districts are now convinced that we have tackled the problem in the right spirit and now admit our methods are the only methods possible. The table given below shows the position of our Premium bulls. It might here be pointed out that this table only shows those bulls that are on our Registers. Time expired bulls (i.e.), bulls having worked for three years are taken off our books, but may be still working in other villages. A number of villages have good bulls but are not helped by us as the bull owner will not accept our restrictions although they accept our advice and guidance :—

Northern Division	76
North Central Division	67
South Central Division	71
Southern Division	75
Total ..	289

Shows and Cattle Ralleys.—During the year owing to pressure of work and finance only the following cattle ralleys and shows were held :—

Northern Division ..	1	Chharodi.
North Central Division	1	Asoda.
South Central Division	1	Pandharpur.
	2	Mhaswad.
	3	Gadda.
	4	Khatagun.
Southern Division ..	1	Devargud.
	2	Athani.
	3	Hasoratti.
	4	Haliyal.

in all 10.

Our shows are very well attended and these are really competitive now and not merely gatherings to give rewards.

Registration.—The following are the registrations of pure bred stock up-to-date :—

	Rs.
Northern Division	921
North Central Division	175
South Central Division	429
Southern Division	559
Total ..	2,084

The progress has been slow as the District Staff have other urgent work to do in connection with Rural-up-lift work. Moreover Inspectors under my control of which there are only 4, have no peon or assistant of any kind.

Live Stock Improvement Act, 1933.—Villages in Thana, Sholapur, Dharwar and East Khandesh have been surveyed and selected for the introduction of this Act.

NORTHCOTE CATTLE FARM, CHHARODI.

Personnel.—Mr. B. B. Jamaspjina held charge of the farm throughout the year.

Season.—The year was not a favourable year for agriculture on account of failure of rains during latter part of crop growth.

Cultivation.—The rains were favourable at the start hence it afforded facilities for farming operation in time. The yield of crops however was below expectation on account of lack of rains during latter part of crop growth. Sowing of rabi crops could not be taken up to the usual standard for want of late rains and crops like soya-beans and pulses failed to seed in several cases.

Silage.—Green fodder such as Maize, Jowar and grasses, was put in silo pits to the extent of 381,150 lbs. as against 146,406 lbs. during previous, year.

Crops.—Total cultivable area was 80 acres and 19 gunthas of which about 45 per cent. was under Jowar, 15 per cent. under Maize, 7 per cent. under Bajri, 22 per cent. leguminous crop, 4 per cent. under Soya-beans and the remaining 7 per cent. under miscellaneous crops such as elephant, grass, etc.

Jowar.—Total yield of Jowar crop from 36 acres and 15 gunthas was 109,865 lbs. green and 56,603 lbs. dry fodder with 18,690 lbs. seed.

Maize.—A plot of 9 acres yielded 117,712 lbs. of green fodder.

Bajri.—The area under Bajri was 6 acres which yielded 9,128 lbs. of dry fodder and 4,656 lbs. Bajri grain.

Soya Bean.—Two varieties of Soya-beans were sown, viz., yellow and brown. The former yielded 357 lbs. green and 399 lbs. dry fodder with 151 lbs. as grain from one acre. The latter yielded 3,808 lbs. of dry fodder and 14 lbs. of grain from 2 acres.

Groundnut.—This crop has yielded 4,494 lbs. of dry fodder and 2,760 lbs. nuts from 4 acres.

Gram.—The crop was taken as dry winter crop and has yielded 952 lbs. of fodder dry with 150 lbs. grain from 4 acres. The crop entirely failed from a block of 5 acres and 30 gunthas.

Pulses.—The following pulses were tried :—

Name.	Area.	Yield.		
		green.	dry.	grain.
	A. g.	lbs.	lbs.	lbs.
Tuver	3 10	7,965	....	....
Mug	1 0	854	2,016	....
Chavali	2 0	623	6,524	60
Udid	1 0	476	....	48

Berseem.—The area under Berseem was 1–10 and has yielded 46,400 lbs. green fodder in 4 cuttings. This helped considerably in supplying green fodder during winter.

Oats and Peas.—A block of 10 gunthas yielded 4,326 lbs. green fodder.

Hay-Making.—Most of the area is now sold, as the farm is now meeting its fodder requirements from better cultivated crops. 145,989 lbs. of hay was made during the year as against 230,100 lbs. during previous year costing Rs. 1–15–4 per 1000 lbs. as against Rs. 1–15–11 during previous year. The shortage by about 84,000 lbs. of hay from the same area when compared with that of the previous year was mainly due to lack of sufficient rainfall during the year.

Live-Stock.—The strength of the herd during the year stood as under :—

	Opening.	Closing.
Stud bulls	5	4
Cows	78	88
Heifers	42	59
Young bulls	45	47
Cow-calves	37	34
Bull-calves	36	41
Buffalo bulls	13	24
Bullocks	52	51
Buffalo bullocks	1	....
Total ..	309	348

The breeding herd has increased during the year by 41, the total being 297 as against 256 at the beginning of the year. This number excludes all bullocks and castrated stock. All cows that calved during the year were milked with the exception of one—showing thereby that a herd which was a non-milking one sometime back, has become entirely a milking herd.

The farm herd is divided into three sections each headed by a suitable bull possessing desirable qualities.

During the year 12 heifers calved for the first time as against 18 during previous year. Several of these belong to Commonsalt vs. Mineral mixture experiment. Their performance records are under study. It is too early to judge them at this stage.

Number of births during the year was 62—35 males and 27 females—as against 63 during previous year. The percentage of calving to cows in the heard works out to 79 as against 88 during the previous year. This reduction of 9 per cent. is due to after effect of Foot and Mouth and Small pox which made the cows come into heat often.

Deaths and diseases.—The farm was free from Epizootics of any kind. Foot and Mouth disease appeared in a very virulent form but all animals both young and adult passed through safely.

There were 10 deaths during the year. These were—6 calves under 6 months of age, 3 animals from 1 to 3 years and 1 adult animal.

Sales.—During the year 24 animals were sold and 2 sent to Pinjrapole. Average prices realised per animal comes to Rs. 57–7–0 as against Rs. 80–10–6.

Premium bulls.—During the year the farm issued 19 bulls on premium system as against 22 during previous year as under :—

9	Ahmedabad District.
4	Kairs District. (One cow bull and 3 buffalo bulls.)
1	Surat District.
5	Panch Mahals District.
19	Total.

Cattle received.—24 buffalo bull calves—21 from College Dairy, Poona, and 3 from Surat—were received by the Farm for being reared as future breeding bulls.

Breeding policy.—As explained in previous report the policy adopted on the farm is to produce an economic animal with desired breed characteristics. Thus we have kept foremost in our mind early maturity, regularity of calving and type. The Appendix I shows the improvement made and the part played by sires in this improvement. Regularity of calving is well maintained, almost every farm bred cow drops a calf annually. There has been a steady improvement of milk yield per

animal. The total annual yield of milk was 134,909 lbs. as against 137,323 lbs. during previous year, the number of milch animals remaining almost the same viz. 77 as against 80 for the previous year.

Milk yielding capacity.—During the year under report 10 animals have yielded over 3,000 lbs. of milk in a lactation of about 360 days and have in addition suckled a calf. The progress is good when compred with a average yield of 420 lbs. of milk per animal in 1920.

Appendix II attached gives the production and disposal of milk during the year.

Several experiments carried out on the farm have been published in " Annual Experimental Records ".

Cattle Breeding Farm, Bankapur.

Personnel.—Mr. A. B. Gadagkar was in charge of the farm throughout the year.

Season.—The season started well with Anti-monsoon rains and then proper monsoon with occasional breaks up to end of July. There were scanty rains during August and September which caused a serious set back to crops. Had it not rained in October there would have been a total failure of crops. The rains were not favourable to grass lands.

Hay.—42,510 lbs. of hay was harvested as against 59,000 lbs. during previous year. The cost of harvesting, carting, etc., works out to Rs. 4-3-0 as against Rs. 3-0-11 per 1,000 lbs. (excluding labour).

Experiments.—Experiments with various types of indigeneous and imported grasses have been continued as under :—

1. *Brazillian grasses*—
   (*a*) Gordura. (*b*) Jaragway.
2. *Indigeneous grasses*—
   (*a*) Elephant, (*b*) Guinea.
3. *Grasses sent for trial from Bangalore* :—
   (*a*) *Andropogon—annulatus.*
   (*b*) *Penecetum—cenchroides.*
   (*c*) Hariyali.

The Brazillian grasses failed during the year due to scanty rains.

Indigeneous grasses continued to give good results.

The grasses from Bangalore yielded half of what they did during previous year as the rains were not favourable.

Live Stock.—There has been a slight increase in the herd by about 9 animals, the total strength of the herd being 146 as against 137 during previous year as under :—

	Closing.	Opening.
Stud bulls	5	5
Cows	38	39
Heifers	33	30
Young bulls	21	17
Cow calves	13	20
Bull calves	20	13
Bullocks	16	13
Total ..	146	137

There is a marked improvement in the size and colour of the herd. The herd is now almost uniform in colour with early maturity and regular calving. There were 33 calvings during the year as against 38 during the previous year. We have been able to fix uniform colour and eradicate pendulous sheath by selection.

Deaths and Diseases.—The farm, though situated in a dangerous zone of cattle disease, was entirely free from any outbreak of disease. Preventive measures were taken against Black Quarter and Hœmorrhagic Septicæemia. Construction of cattle dip and feeding of mineral salts are mainly responsible for excellent health of stock.

Ensilage—During the year under report 4 katcha pits were filled with 282,650 lbs. of green Maize, Ragi and grass as against 323,110 lbs. of fodder in six pits during previous year.

Fodder crops.—The area under cultivation during the year was 30 acres as against 28 acres and 20 gunthas during previous year. Further trial with Ragi as fodder crop has proved very successful. The cattle like it very much and thrive well on this fodder.

Maize.—Maize was the main crop used for silage making. The area under maize was 13 acres and 30 gunthas as against 13 acres and 10 gunthas during previous year yielding 195,600 lbs. and 187,785 lbs. green fodder respectively. In addition to this green fodder, 13,660 lbs. of semi dry fodder was obtained during the year.

Ragi.—Our experience with Ragi as fodder crop shows that it is a good cattle feed both as green and silage as cattle like it very much and leave no wastage. The area under this crop was 6 acres and 30 gunthas which yielded 60,550 lbs. green and 5,256 lbs. dry fodder with 495 lbs. seed. The yield is comparatively low during the year on account of insufficient rainfall.

Jowar.—This was taken as rabi crop on 10 acres and 30 gunthas yielding 8,100 lbs. dry fodder and 420 lbs. grain. The crop remained stunted on account of absence of late rains.

Soya-Beans.—Two varieties were tried viz., (1) Mammoth yellow—This was grown on 1 acre and 5 gunthas. For the last four years we

have found that, this variety is very susceptible to insect pests. Due to this damage, it yieled only 36 lbs. of grain and 60 lbs. fodder. (2) Large yellow—The area under this crop was 4 acres and 37 gunthas yielding 616 lbs. seed and 928 lbs. fodder per acre as against 907 lbs. seed and 1,429 lbs. fodder per acre during the previous year.

Kulthi.—Kulthi was grown as a rotation crop after maize. The crop practically failed on account of insufficient rains.

Annual Report of the Government Central Poultry Farm, Kirkee, for 1935-36.

Personnel.—The Farm was in charge of Mr. V. C. Charanti throughout the year under report. The post of Assistant Manager was sanctioned for six months from 1st February 1936 and Mr. Kamble was appointed to hold the same.

Live Stock.—No new blood was imported during the year under report. The Farm started with 675 birds and finished with 765 up to 31st March 1936. This shows an increase of 90 birds over the last year's figure, *vide* Statement I.

Incubation.—Incubators were started early in October 1935 and were closed down in April 1936. 1,129 chicks were hatched out during the season as against 877 of the previous year. This shows an increase of 28 per cent. The increase was due to the large number of cockerels that are required to be put out in villages under rural uplift scheme. The percentage of hatchability is 76·44 during the year as against 74·66 of the previous year. Stating of incubators early showed better results of hatchability.

Testing Pens.—Statement II shows the classification of individual egg laying record of bird for 10 months of the year under report.

Distribution.—The following number of birds and chicks and setting eggs were sold during the year under report :—

	Adult Birds.	Chicks.	Setting Eggs.
Government Stations ..	250	....	1,326
Out Stations	558	....	396
	808		1,722

Full details are given in Statements III, IV and V.

General.—The Farm had a very successful working year. The total expenditure incurred on the farm including the Manager's pay amounting to Rs. 4,154-0-0 and total realisations Rs. 4,134-9-9, *vide* Statement VI. This gives in detail as to how the farm finances were spent and how the realisations were made.

Teaching.—12 students were trained in Practical Poultry Farming on the Government Central Poultry Farm during the year under report.

STATEMENT I.

Statement showing the strength of Flock at the Government Central Poultry Farm, during the year 1935-36.

	Description						Remarks.
	Cocks.	Hens.	Cockerels.	Pullets.	Chicks.	Total.	
1. White Leghorn ..	3	44	56	45	269	417	
2. White Whyandotte ..	1	20	17	6	37	81	
3. Rhode Island Red ..	2	24	11	20	113	170	
4. Austrolorp	1	8	19	7	35	70	
5. Black Minorcas ..	1	2	1	..	20	24	
6. Firangees	..	..	..	3	..	3	
Total ..	8	98	104	81	474	765	

STATEMENT II.

Classification of Individual Egg laying record of birds at the Government Central Poultry Farm, Kirkee for 1935–36.

Pen No.	Hen No.	No. of Eggs.	Weight of Eggs in ozs.	Average weight of Egg. in ozs.	Remarks.
Actual record for 10 months. White Leghorn.					
1	1	Died	..	..	
2	3	211	379¼	1·79	
3	5	Died	..	..	
4	7	141	282¼	2·00	Broody four times.
5	9	Died	..	..	
6	11	204	375	1·83	
7	13	171	350¼	2·05	
8	15	182	337¼	1·85	
9	17	208	418	2·03	
10	19	169	355⅛	2·09	
11	21	191	353¾	1·85	
12	23	163	307⅜	1·88	Once broody.
13	25	Died	..	..	
14	27	155	321½	2·07	
15	29	Died	..	..	
16	31	185	341⅝	1·84	
17	33	161	342¾	2·13	Five times broody.
18	35	189	372¼	1·90	
	13	2,330	4,537	1·94	Over all average eggs for 10 months=180.
Actual record for 10 months. White Wyandotte.					
1	2	128	294¼	2·30	Four times broody.
4	8	Died	..	..	
7	14	115	258	2·24	Non broody.
10	20	Died	..	..	
13	26	99	200⅞	2·02	Non broody.
16	32	198	402⅛	2·02	Once broody.
	4	540	1,158⅛	2·13	Over all average of Egg for 10 months=135 per bird.
Rhode Island Red.					
2	4	Died	..	..	
5	10	137	307⅝	2·25	Non broody.
8	16	225	474⅛	2·10	Do.
11	22	153	312½	2·03	Do.
14	28	109	253⅛	2·17	Four times broody.
17	34	143	291¼	2·03	Non broody.
	5	767	1,620⅝	2·11	Over all average of eggs for 10 months=153·4 per bird.

STATEMENT II—*contd.*

Pen No.	Hen No.	No. of Eggs.	Weight of Eggs in ozs.	Average weight of Egg in ozs.	Remarks.
		Australorps.			
3	6	210	459⅝	2·18	Non broody.
6	12	144	311⅜	2·10	Do.
9	18	131	274⅛	2·09	Once broody.
12	24	Died	..	..	
15	30	144	313¼	2·17	Once broody.
18	36	150	317	2·11	Four times broody.
	5	779	1,675⅜	2·15	Over all average of eggs for 10 months=155·8 per bird.

Flock average.

27 birds, 4,416 eggs in 10 months=163·4 per bird.
weight=2·02 per egg.

STATEMENT III.

Statement showing adult birds and chick put out in the Districts during the year 1935–36.

Name of Division.	No. of birds put out in 1935–36.			
	Cocks.	Hens.	Chicks.	Total.
Northern Division including Bombay Suburban area.	36	29	11	76
North Central Division, South Central Division.	90	185	329	604
Southern Division	24	52	..	76
Native States and outside the Presidency.	26	21	1	48
Total ..	176	287	341	804

STATEMENT IV.

Statement showing the number of birds and setting eggs supplied to private persons from the Government Central Poultry Farm during the year 1935-36.

Serial No.	District.	No. of birds.	No. of setting Eggs.
1	Satara	30	93
2	Poona	380	805
3	Sholapur	9	12
4	Nasik	17	30
5	Khandesh West	..	12
6	Khandesh East	..	35
7	Broach	21	12
8	Ahmedabad	3	..
9	Bombay	44	9
10	Thana	..	36
11	Kolaba	19	153
12	Dharwar	1	15
13	Ratnagiri	..	24
14	Belgaum	..	12
15	Indian States outside Presidency	34	78
	Total ..	558	1,326

STATEMENT V.

Statement showing number of birds and setting eggs supplied to Government stations from Government Central Poultry farm during 1935–36.

Serial No.	Name of Institution.	No. of birds.	No. of setting Eggs.	Remarks.
1	City Church School, Poona	..	36	
2	Ramabai Mukti Mission, Kedgaon ..	..	24	
3	Village Improvement, Shikarpur ..	10	..	
4	Village Improvement, Lono Kaud ..	2	..	
5	Village Improvement, Koregaon, Bhima ..	6	..	
6	Village Improvement, Belsar ..	10	..	
7	Mahalkari, Dhond Peta	3	..	
8	Village Improvement, Islampur	36	..	
9	Taluka Development Association, Tasgaon ..	..	30	
10	Taluka Development Association, Karad ..	7	..	
11	Taluka Development Association, Khanapur ..	..	12	
12	Taluka Development Association, Islampure ..	4	..	
13	Taluka Development Association, Dahivadi ..	2	..	
14	Taluka Development Association, Medha ..	4	..	
15	Village Improvement, Pandharpur ..	18	..	
16	Village Improvement, Sangola	12	..	
17	Taluka Development Association, Yeola ..	6	..	
18	District Agricultural Overseer, Malegaon ..	1	84	
19	7th Day Adventist Mission, Lasalgaon ..	..	72	
20	Vernacular Agricultural School, Dhulia ..	4	12	
21	Rev. O. Elgnor, Dhanora	8	..	
22	Taluka Development Association, Pachora ..	..	30	
23	Rev. Cornalins, Chopda	..	24	
24	Taluka Development Association, Bhusaval ..	3	..	
25	Taluka Development Association, Jalgaon ..	12	..	
26	Taluka Development Association, Jamner ..	2	..	
27	Visapur Jail	21	..	
28	Vadala Mission	1	..	
29	Rev. Mumoow, Ankleshwar	8	..	
30	District Agricultural Overseer, Palghar ..	..	24	
31	Taluka Development Association, Palghar ..	..	12	
32	Mamlatdar, Panvel	3	..	
33	Village Improvement work, Panvel ..	12	..	
34	Mamlatdar, Mangaon	4	..	
35	Mahalkari, Uran Peta	1	..	
36	Mamlatdar, Pen	4	..	
37	Mamlatdar, Alibag	3	..	
38	Rev. Wiby, Ratnagiri	10	..	
39	Agricultural School, Rajapur	1	..	
40	Mamlatdar, Ankola	8	..	
41	Anti Famine Institute, Bijapur	10	..	
42	Director, Agriculture and Fisheries, Travancore.	6	..	
43	Rural Reconstruction Centre, Kosamba ..	6	..	
44	7th day Advintist Mission, Krishnarajapuran .	2	..	
	Total ..	250	396	

STATEMENT VI.

Showing the Financial position of the Government Central Poultry Farm for the year 1935-36.

Expenditure.	Rs.	a.	p.	Income.	Rs.	a.	p.
Contingencies :—							
Cultivation charges ..	897	0	0	12,891 Table eggs at 0-14-0 dozen ..	966	12	9
Petty construction and repairs ..	570	0	0	1,722 setting eggs at Rs. 3 per dozen ..	511	4	0
Purchase and up-keep of Live Stock (this includes all labour) ..	1,481	0	0	808 Fowls ..	2,539	14	0
Purchase and upkeep of dead stock ..	77	0	0	Miscellaneous income, grass, vegetable etc. ..	247	2	6
Office expenses and Miscellaneous ..	109	0	0				
Pay of Manager ..	1,020	0	0				
Total ..	4,154	0	0	Total ..	4,265	1	3

APPENDIX I.

Effect of bull in Eearly Maturity.

Serial No.	Dams. Name.	Age at first calving.	Daughters. Name		Sire	Age at first calving.
		Y. m.				Y. m.
1	Bhotu ..	4 6½	Bhotu	2–32 ..	Kesar 6–28 ..	3 3
2	Padol ..	4 0	Padol	15–31 ..	,, ..	4 10½
3	Silor ..	4 5½	Silor	3–32 ..	,, ..	3 9
4	Samli ..	3 7¼	Samli	7–32 ..	,, ..	3 7¼
5	Vanzari ..	4 1¾	Vanzari	6–32 ..	,, ..	3 7½
6	Chokhli ..	3 11½	Chokhli	5–32 ..	,, ..	3 11
		24 8½				23 ¼
		4 1¼				3 10
7	Bodli ..	3 10¼	Bodli	7–31 ..	Bhotu 41–25..	4 1
		3 10¼				4 1
8	Vanar ..	4 5¼	Vanar	1–32 ..	Todar ..	3 4¾
		4 5¼				3 4¾
9	Padol ..	4 0	Padol	10–38 ..	Chandbe 20–28	3 ¾
10	Medhi ..	4 1	Meddi	12–32 ..	,, ..	3 4¾
		8 1				6 5½
		4 ½				3 2¾
11	Vanzari ..	4 10½	Vanzari	12–31 ..	Kachari 8–25.	4 1½
12	Kesar ..	3 4	Kesar	4–31 ..	,, ..	4 5
		8 2½				8 6½
		4 1¼				4 4¼

APPENDIX II.

Statement showing the Milk and Milk products, their production and disposal at the Northcote Cattle Breeding Farm Chharodi during the year 1935-36.

Items.	Quantity.	Value.	Remarks.
	lbs.	Rs. a. p.	
Milk produced ..	134,909 0	....	
Milk Sold ..	19,853 8	620 6 9	at 0-0-6 per 1 lb.
Milk and Colostrum fed .	5,297 0	165 8 6	Do.
Milk used for test ..	621 0	19 6 6	Do.
Separated milk produced.	98,970 12	257 11 9	at 24 lbs. per anna.
Separated milk fed ..	98,970 12	257 11 9	Do.
Cream produced ..	7,653 4	....	
Cream churned ..	7,611 8	....	
Ghee produced ..	3,673 6	....	
Ghee sold ..	3,610 8	2,535 6 0	at varying rates from 0-11-0 to 0-14-0 per lb.
Ghee fed ..	12 0	8 12 6	Do.

INFANTS AND PUBLIC MILK SUPPLY COMPANY LIMITED, BOMBAY.

Palghar Dairy Farm.—I am pleased to report that the farm is maintaining the progress of improvement with Mr. P. P. Mistri as Managing Director.

The company has made a substantial profit and paid dividend to its share-holders.

Total milk produced during the year was 449,010 lbs. as against 437,422 lbs. during previous year.

The area under fodder crops during the year was 42 acres and 10 gunthas. More land is gradully brought under cultivation by clearing the area.

More and more area is enclosed every year by erecting pucca fencing.

TALUKA DEVELOPMENT ASSOCIATION CATTLE BREEDING FARMS.

1. The Taluka Development Association, Shirpur (Sangvi Farm) is not doing very well mainly on account of continuous contagious abortion occurring on the farm. Until this is eradicated, little progress is possible. The housing arrangements require to be altered to check

the contagious abortion. The Village Improvement Association, West Khandesh, *Dhulia*, has agreed to subsidise the farm with a sum of Rs. 1,100 by way of one Mhaswad Khillar bull and 4 cows.

2. The Taluka Development Association, Jalgaon (Pimpale Farm) is doing very good work. During the year under report Village Improvement Committee, East Khandesh, Jalgaon has sanctioned a sum of Rs. Rs. 3,500 as under.

Rs.

1,000 for purchase of cows.

18 Nimar cows and 4 Nimar bulls have been purchased, by the Divisional Inspector, N., C. D., for Rs. 795–8–0.

500 for cattle feeds.

1,000 for purchase of goats. (24 Jamna Pari goats and 2 bucks).

1,000 for purchase of poultry.

The last three items were purchased by Taluka Development Association directly.

The striking features of the farm are :—

(*i*) almost annual calving.

(*ii*) starting of milking the herd.

The farm is useful and requires to be encouraged.

3. The Taluka Development Association, Jamner (Gangapuri Farm) is another useful farm for Nimari breed. The Village Improvement Committee, East Khandesh, Jalgaon, has sanctioned a sum of Rs. 1,500 Rs. 1,000 for purchase of cattle (18 cows, 3 heifers and 5 bulls have been purchased by the Divisional Inspector, N. C. D., for Rs. 821–8–0 and Rs. 500 for concentrates.

The Pimpale and Gangapuri farm seem to do very useful work in Nimari breed. I recommend them to be subsidised.

Agricultural Marketing Survey.

During the year under report the Live Stock Expert held charge of Marketing Officer for the Bombay Presidency in addition to his duties as Live Stock Expert.

As reported last year four Assistant Marketing Officers continued the survey of various Agricultural and Dairy products. Reports on the following subjects have been completed and the results of the surveys are described below :—

1. Groundnuts.
2. Linseed.
3. Wheat.
4. Rice.
5. Tobacco.
6. Grapes.
7. Bananas.
8. Strawberries.
9. Milk.
10. Cattle.
11. Eggs.

Marketing

Groundnuts.—About 13 per cent. of the crop produced is retained in the producing area and the rest is marketed in the form of pods except in Sholapur District where it is marketed in the form of seeds. Except in the Patan Taluka of Satara District watering of groundnut is not so badly reported as in Madras. Groundnut oil has become the common edible oil in the Presidency and the seeds are crushed by means of country ghanis, rotaries and expellers. A large quantity of groundnut oil is used for making vegetable ghee in Bombay and Northern India. Bombay is a very important groundnut crushing and exporting centre and the groundnut trade there is organized under the auspices of Grain Merchants' Association and the Oil Seeds Traders' Association. About 70 per cent. of the groundnut cake produced in this Presidency is exported to foreign countries viz. France, Italy, United Kingdom, Germany and Netherlands and the remaining 30 per cent. is used as manure and cattle feed.

Linseed.—The area under this crop varies from 125,000 to 150,000 a year, producing 12,000 to 14,000 tons of linseed. Under normal conditions the acreage under linseed is not likely to increase unless a good type competing with wheat in money value is obtained. The most of the linseed area falls in Bijapur, Ahmednagar and Nasik districts the first two being in the famine or scarcity zone hence resistance to drought should be an essential characteristic of the variety needed. The details of marketing systems such as measuring, weighing, cleaning, etc. vary from place to place. If linseed is cleaned by means of sieves before sending to local markets there would be a saving of 6 per cent. on transporting. There is no local demand for linseed cake and at present it is mostly exported. There are some mills and firms which extract linseed oil, and manufacture paint. The trade in linseed has been regularized in Bombay under the auspices of the Grain Merchants' Association and the Marwadi Chamber of Commerce.

Wheat.—Inspite of the local growths of wheat the Bombay Presidency imports wheat and wheat flour from the Punjab, Central India, Central Provinces and United Provinces sometimes also from Australia. It exports wheat to Aden and Dependencies, Straits Settlements, Zanzibar, Tanganyika, in addition to Mysore State, Nizam's Dominions and Central Provinces. Statistics indicate that quantities of our imports are roughly five times of our exports. The total quantities of wheat consumed in the year 1934–35 in the Bombay Presidency were 467,905 tons or roughly 58 lbs. per head per annum.

Bombay and Ahmedabad are the milling centres of wheat. The latter depends mostly upon local growths of wheat such as Wagia and Chandushi. Usually prices of wheat are relatively low just after harvest time as most of the cultivators sell their wheat at that time. Bijapur is the biggest wheat exporting centre of this Presidency. In Bombay the Grain Merchants' Association and the Marwadi Chamber of Commerce handle wheat on a large scale. The former deals largely in ready sales while the latter in " Futures ".

Rice.—In Bombay Presidency Konkan grows about 53 per cent. of rice. Other tracts grow about 15 per cent. each. There are many varieties of rice.

Bombay Presidency imports large quantities of rice from Burma, Madras, Central Provinces, United Provinces, Bengal, the Punjab and Sind, and exports considerable quantities to Africa, Bahrein Islands, Persian Gulf, Kathiawar, Goa, Central Provinces, Central India, Nizam's Dominion and the Madras Presidency. Burma rice is in great demand and roughly 40 lakhs of bags are imported annually. The consumption of rice per capita is roughly 150 lbs. per annum. Statistics indicate that quantities of our imports of rice are roughly four times of our exports.

Imports and exports of paddy are on a small scale. Paddy is marketed on primitive methods. Millowners or their agents make purchases of paddy and store it in their mill compounds. Prices of rice are fixed on local units such as khandi, phara, etc. which vary from district to di trict. The Gavati Rice Merchants' Association, Bombay, and the Rice Merchants' Association, Bombay, deal in rices, the former in local rices and the latter in ready and forward transactions of Burma rices.

Tobacco.—There has been a steady increase in the area under tobacco and the total area during 1934–35 was 179,803 acres. Nearly 25 per cent. of the produce from this Presidency is sold in the form of bundles, mostly for chewing, preparing snuff or for smoking in chilum or hukkah. The remaining produce is prepared in the form of roughly crushed leaves—called bhuka or chura. In this form it is extensively in demand for preparing the various blends of tobacco mixtures for manufacturing bidies (country cigarettes) and also for chewing and for snuff etc. There is a great demand from Bengal, Central Provinces and Madras for the tobacco produced in the vicinity of Nipani in Belgaum District.

The present marketing practices of this produce hardly agree in any two places. This is a great handicap both for the up-country buyer and for the cultivator. Another handicap is the delayed payments to the growers. Then again there is a wide variation in taxes levied in different towns and cities on the imports of this produce. There do not exist any organized standards or grades for the tobacco in this Province.

Grapes.—The area under this crop is 952 acres mostly situated in Nasik District. The supply of grapes from this area is available from February to the end of May when there is practically very little competition from the grapes of other localities. From July to October fairly large quantities of grapes from Chaman and Quetta arrive in Bombay and from October to January from Foreign countries principally from United States of America.

At present Calcutta and Bombay are the two major markets for the Nasik grapes. Several improvements in the packing, transport facilities and careful handling of parcels by railways are needed before the Nasik grapes could find larger markets.

Bananas.—This crop is grown all over the Presidency mainly for meeting the local demand but there are two important specialized areas—one in Thana District and the other in East Khandesh which cater for

distant markets such as Delhi, Agra, Ludhiana, Amritsar, Lahore, Indore, Bhopal, Jodhpur, Rutlam, etc. Major portion of the production of Thana District finds a ready market in the City of Bombay. The marketing system is not satisfactory in that there is no direct contact between the growers or the local merchants and the businessmen of these distant markets nor is there any organized commercial intelligence received from these markets.

Strawberries.—The area under this crop is situated in the vicinity of the Hill-station of Mahableshwar and the areas is only 35 acres. The produce from this area is almost entirely consumed locally and only a small portion finds its way to Bombay, Poona and Belgaum. There is practically no organisation for the sale of these fruits and a very large number of the producers themselves hawk about the strawberries and thus spend a good part of their time and energy in selling small lots.

Milk.—The supply of milk is partly met from milch stock maintained in the town and partly from those maintained in villages adjoining towns. Buffaloes are preferred to cows because buffalo milk is in greater demand than the cow milk. The number of families maintaining milch stock for their domestic purposes is greater in smaller towns. It has been found that about 11 to 15 per cent. of the total quantity of milk produced near towns is utilized in tea preparations and about 12 to 30 per cent. in the form of drink as fluid milk. About 70 per cent. of the total production is used for ghee making in Surat District. The most quantity of milk is produced during the months of November to January and the least in May to July.

Kaira District and certain parts of Kadi Prant of the Baroda State are the main sources of supply of cream for the manufacture of creamery butter. In 1934–35 Bombay alone was supplied with 2,720,000 lbs. of cream from these places, over and above what was supplied to the Polson's Dairy at Anand which manufactured 1,341,960 lbs. of butter in 1935. Bombay also received 1,086,400 lbs. of Khava from North Gujarat during 1934–35 and it draws its butter supply for local consumption mainly from the Khandesh Districts. The Municipalities of Bombay, Ahmedabad, Broach and Surat have enforced the operations of the Bombay Prevention of Adulteration Act, 1925, and the standards laid down for genuine quality of milk are 6 per cent. fat and 9 per cent. solids (not fat) in the case of buffalo milk and 3·5 per cent. fat and 7 to 8·5 per cent. solids (not fat) in the case of cow milk. Boric acid was detected in 41 samples and formaline in 14 samples. Traffic in separate milk is of great importance in the case of rail traffic to Bombay.

Cattle.—During the year ending December 1935 Bombay City imported 14,900 buffaloes from the Punjab and 12,000 buffaloes from Mehasna in addition to the annual importation of about 10,000 Surti buffaloes from Gujarat for its milk supply. The peak period of this traffic is from July to October and the slack season is from December to February.

There are about 125 places in the North, South and Southern Divisions where weekly cattle markets are held. In the Northern Division, however, only one weekly cattle market is held at Ahmedabad. Besides

the weekly markets cattle fairs and shows are held in the Bombay Presidency. A fair known as the Malajar cattle fair held annually in the Jodhpur State (near Titwara railway station) in the second fortnight of March is well attended by certain class of people from North Gujarat for purchase of bullocks. In North Gujarat just after Holi a number of bullocks are brought for sale by a tribe of people known as Sindhis in Gujarat who make their annual appearance. It is estimated that their dealings go to about 75 bullocks per annum in half a dozen villages. Bullocks are valued at nearly three to four times their actual value and the payment is required to be made in certain annual instalments beginning with the first one in hard cash.

The Municipalities or Gram Panchayats levy some market charges if a cattle fair is held under their jurisdiction and these charges differ from place to place.

Eggs.—Bombay is the biggest market for eggs, consuming about 2 lakhs of eggs per day. It draws its supplies from the Deccan, South Gujarat and from Northern India, Calcutta and Cochin, 75 per cent. being from the Deccan, 20 from South Gujarat and 5 from other sources. Billimora eggs are prized the most in Bombay market for their taste and flavour.

Ahmedabad is the next important market for eggs receiving up to about 10,000 eggs per day from South Gujarat. Kathiawar and Central India also get some eggs from South Gujarat but of late the trade has dwindled down to insignificance due to low prices offered.

Of the various types of packages used for packing eggs, the Gujarat earthen pot type and the one of bamboo from Cochin are supposed to be the best.

Rural Uplift Work.

Under rural uplift work the following four schemes have been started :—

Scheme No. 1.—Improvement of Buffalo and help to the villager.

Scheme No. 2.—Poultry improvement in villages.

Scheme No. 3.—Pedigree poultry keeping for benefit of the public.

Scheme No. 4.—Co-operative egg-Collecting, grading and marketing.

Scheme No. 1.—*Improvemeat of the Buffalo and help to the villager.*—The Scheme started its working with the appointment of Mr. C. N. Dave as Inspector and four Herdsmen at various centres by the end of September 1935. The Herdsmen prior to their joining duties at various centres, were given training at the Poona College Dairy for about one month.

The following centres were selected for the purpose of testing buffaloes and subsequently for selection of buffalo bull calves :—

(1) Anand, (2) Jalgaon, (3) Belgaum, (4) Pandharpur.

Total number of buffaloes tested and dairy demonstrations held were 506 and 95 respectively. Number of buffalo bull calves selected was 34

Several places were visited in connection with giving of advice on various subjects such as cattle breeding, buffalo keeping, dairying, manufacture of dairy products, feeding of cattle and testing of milk.

Villagers were addressed at various meetings and rural uplift classes on cattle breeding their management, dairying, etc., applicable to village conditions.

The work has been highly appreciated by Ryats, so much so that they have sent their appreciation letters to that effect.

Scheme II—Improvement of Poultry in villages.—

Staff Inspector.

Kamgar and Peon.

The scheme started working from 23rd of September 1935. The Poultry kamgar joined on 15th September 1935 and was given training for 2 weeks on the Central Poultry Farm, Kirkee.

This scheme is to remove all country cocks from the village selected and give in their stead English birds bred and acclamatised on the Central Poultry Farm, Kirkee.

The following table gives number of cocks put out in each district from October 1935 :—

	District.	No. of cocks.
1.	Poona	44
2.	Belgaum	24
3.	Sholapur	28
4.	Satara	49
5.	Ahmednagar	12
6.	Kolaba	22
7.	Dharwar	20
	Total ..	199

Each village supplied with the cocks hatched out a large number of chicks and now we have about 2,000 chicks in villages. Few of the early hatched pullets are now beginning to lay also.

Scheme IV.—The Poultry Kamgar was stationed at Ellur in Walwa Taluka of Satara District to begin co-operative egg collecting and marketing scheme. This centre was selected as there are 18 villages in 5 miles radius around Ellur which have about 5,000 fowls and many dozens of eggs are produced daily. The kamgar does grading and candling of eggs before sending them to Bombay. From 1st November 1935 to July 1936, 37,526 eggs were candled and sent to Bombay by the Society. The Society also got an incubator on loan from the Government Central Poultry Farm, Kirkee, to hatch chicks and did hatching of about 200 eggs. The result was about 65 per cent.

There is also another egg collecting society at Belgaum. Here all producers keep better fowls and this being a Military Station eggs are in great demand. The society handled 6,367 eggs in last eight months.

Scheme III—Poultry Station Scheme.—One premium of Rs. 75 to start a pedigree poultry farm was given at Korti in Pandharpur Taluka.

Programme of Work under the Live Stock Expert to Government, Bombay Presidency, Poona, for the year 1936-37.

I. *Breeding Farms.*—The policy of breeding up reliable pure strain of cattle will continue, keeping in mind the production of more economical animal, which will mature early and calve more regularly. The breeding of a good dual and draught purpose animal on the above lines will continue at Chharodi and Bankapur farm respectively.

II. Nutritional investigations and experiments will be conducted on various food stuffs as far as finances will permit.

III. (*a*) Propaganda in connection with the spreading of the use and benefits of pedigree bulls will continue together with teaching of better methods of care.

(*b*) The Herd Register of all pure cattle of each breed will continue. Thus in a few years we shall have all the pure types of cattle pedigreed as we shall know the dams and sires. This also would help us in tracing the progeny of premium bulls. This method would be of great advantage to breeders as they can with the certificate supplied prove their animals to be well bred.

IV. The Co-operation with the Kandivlee Gowrakshak Mandali will continue in breeding, raising and spreading Gir breed in towns, together with the fine illustration of what can be done if the people are so inclined with Panjrapoles to make them useful institutions to the Country instead of the burden they are at present.

V. The laying out of permanent irrigated pastures and to work out the economic value of the same.

VI. Experiments in growing fodder crops on forms will continue.

VII. *Poultry.*—(*a*) The work of breeding suitable foreign breeds of poultry will continue on the Government Central Poultry Farm, Kirkee.

(*b*) Investigations regarding incubation, control of diseases and feeding of poultry will continue.

(*c*) To help and advise poultry breeders as far as it is possible.

(*d*) Experiments in the egg laying capacity of different breeds in single testing pens will continue.

VIII. *Sheep.*—It is hoped that the sheep breeding scheme will be financed in the coming year and that this very urgent work will be taken in hand.

IX. *Poultry.*—Finances have been allotted for the new schemes submitted. This will be taken during the year.

X. *Buffaloes.*—The work of buffalo improvement will be continued in the Presidency with funds provided.

XI. *Palghar Dairy District Scheme.*—The Palghar Dairy district scheme has been started. It is hoped that two farms will commence milk production during the year.

XII. *Agricultural Marketing Survey.*—The supervision of the Provincial Marketing Scheme will continue.

XIII. *Village Improvement Schemes.*—The work of the following Rural Uplift Schemes will be continued :—

(*a*) *Buffalo Improvement.*—Showing to cultivators how best to utilise their milk, ascertaining for the cultivator which of his buffaloes pays and which does not.

(*b*) Egg Marketing.

(*c*) Village Poultry Improvement on intensive scale.

(*d*) Poultry Station Scheme.

Bombay Gow-Rakshak Mandali.

Kandivlee Gowshala with its sub-station at Betegaon.

The Mandali continued doing good work during the year under report.

The Kandivlee Farm was under the management of Dr. M. D. Patil upto 31st July 1935 with two B.Ag. assistant managers and later on Mr. G. S. Godbole held the charge of the farm with one B.Ag. assistant manager.

The farm was visited by distinguished Government officers such as Mr. Livingston, Chief Marketing Officer, etc.

Crops.—The usual crops grown were Jowar and Maize with guine and elephant grass as perennial crop.

Live Stock.—The Mandali now have 152 heads of pure Gir cattle. During the year 18 heifers have calved for the first time. There were 63 births and 19 deaths.

During the year 144,611 lbs. of milk was produced from 41 heads of cows as against 148,211 lbs. from the same number during previous year.

During the year there were 3 cows that have yielded 4,000 to 5,000 lbs. of milk in a lactation ; 6, 3,000 to 4,000 lbs ; 12, 2,000 to 3,000 lbs.

Bulls.—Seven pedigree bulls were sold during the year.

General.—The Honorary Joint Secretaries are to be congratulated for the very good work and the attention they give to this institute. We have never found any difficulty in getting anything within reason for the farm.

APPENDIX M.

SUMMARY OF WORK DONE UNDER THE AGRICULTURAL ENGINEER TO GOVERNMENT, BOMBAY PRESIDENCY, POONA, FOR THE YEAR 1935–36.

Mr. C. G. Paranjpe held charge of the section during the year under report.

There was a considerable rise in work from every direction owing to increased demand for boring machines, due to failure of rains, and their increased sale. The construction of a New Glass House, modification and extension of the Soil Temperature Tank House at the College of Agriculture, Poona, the construction of quarters and bullock shed at the Cereal Breeding Station, Niphad, and the help required to be rendered to the Deputy Directors of Agriculture, North Central Division and Gujrath, in the absence of their Mechanical Assistants, in machinery matters and the rise in implement work form some of the important activities of the section for the year under report.

Advice and Help.

The number of inquiries for advice in Agricultural Machinery is steadily on the increase as the total number amounts to 197 against 114 of the last year. Out of these 40 are for pumping, 80 for boring, 7 for cane crushing, 16 for tractor ploughing, 8 for implements, 4 for ginning, 2 for grinding, 2 for chaff-cutting, 5 for improved drills and 33 for miscellaneous subjects. There were 27 applications for admission to the Oil Engine Class, out of which only 10 students attended the class and received training in the driving of engines and pumps. The number of drawings turned out amounts to 58 and the number of estimates supplied for machinery amounts to 15. The number of sites surveyed amounts to 9 only and twelve cultivators were given necessary mechanical help in case of difficulties and breakdowns.

Research on Implements.

The work done on implements and modification of machines is confined to 7 items noted below*. The progress done on each is summarised below, in brief.

*(*a*) Improved seed drill.
(*b*) Winnowing Fans.
(*c*) Wheat Thresher.
(*d*) Ball bearing bullock cart wheels.
(*e*) Soil Scooper.
(*f*) Groundnut Digger.
(*g*) Ring Cutting machine.

Improved Seed Drill.—The light weight drills specially made for cotton are found to fulfil most of the conditions laid down by the Deputy Director of Agriculture, Southern Division, Dharwar, and are greatly appreciated by the cultivators in general, for their automatic and uniform sowing and reduced draft. The problem of draft has been practically solved as it ranges between 70 and 80 lbs. in the case of a 2 coultered drill and 90 and

100 lbs. in the case of a 3 coultered drill, for an average depth of 2". The old rope drive has been replaced by chain, which has eliminated slippage and consequent variation in seed rate. The Deputy Director of Agriculture, Southern Division, Dharwar, has requisitioned one more drill of this type for Gadag Centre and the Deputy Director of Agriculture, North Central Division, Nasik, has indented for 2 of this type, one fitted with 2 coulters and the other with 3, for his division in addition to an all steel model for general purpose.

The special Wheat Drill made for Jalgaon Farm has been tried out in several cultivators' fields round about the Farm and was greatly appreciated by them. The following figures give its distinct advantages over the local drill :—

Name of drill.	Draft in cwts.	Seed dropped per acre.	Labour required.	Yield per acre.
Local drill	3½	72	2 men	858 lbs.
Improved automatic drill ..	2½	57	1 man	1,030 lbs.

The results at Bhadgaon Farm, Sholapur and Bijapur Dry Farms are also satisfactory with the all steel model and the total area sown with all these drills amounts to 220 acres approximately. The Agricultural Engineer to United Provinces Government, who happened to inspect these drills during his visit to Poona, has ordered a model of the all-steel drill and the light weight drill for use in his Province. The light weight drill is however an improvement over the all steel model in point of draft, cost and utility. It is practically a conversion of the local wooden drill into an automatic drill.

Winnowing Fans.—The set of fans, one chain driven and the other rope driven, sent to Jalgaon Farm for exhaustive tests, was demonstrated by the Superintendent at various places by holding special demonstrations and the cultivators have very much appreciated their work. The fan with the chain drive has been found to be superior in working to that with the rope drive because of its ease and higher speed ratio. The rope on the latter occasionally slips due to expansion and contraction and in order to eliminate this defect it is replaced by a belt now and will be given further tests in the next winnowing season.

Wheat Thresher.—Two more Gujarat Wheat Threshers having 15 serrated discs were made and supplied to Gujarat Division for demonstration. The one sent to the Agricultural Inspector, Ahmedabad, did not reach in time but the other sent to the Agricultural Inspector at Anand was demonstrated by him at several places and its performance was greatly appreciated by all. The Thresher kept at Jalgaon Farm was demonstrated by the Superintendent to several people and they greatly appreciated its advantages over the local method of threshing wheat.

Ball Bearing Bullock Cart Wheels.—As stated in the last year's report two complete carts fitted with ball bearings and four sets of cart wheels fitted with ball bearings and axle were made and supplied to the following officers for exhaustive tests :—

Name of Officer.	Description of material supplied.
The Horticulturist to Government, Bombay Presidency, Poona.	One complete cart fitted with ball bearings.
The Deputy Director of Agriculture, N. C. D., Nasik.	One complete cart fitted with ball bearings.
The Deputy Director of Agriculture, N. C. D., Nasik.	One set of wheels fitted with ball bearings and axle.
The Deputy Director of Agriculture, S. D., Dharwar.	One set of wheels fitted with ball bearings and axle.
The Deputy Director of Agriculture, Gujrat, Surat.	One set of wheels fitted with ball bearings and axle.
The Manager, Agricultural College Dairy, Kirkee.	One set of wheels fitted with ball bearings and axle.

Out of the above six sets reports on five are very encouraging. The set of wheels supplied to Dharwar Farm could not be tried as the standard size of wheels on this side did not suit their local conditions. A local set of wheels is being sent to Poona for fitting the ball bearings and the results of its trials will be available next year. The results obtained so far are given in the following statement :—

Place of trial.	Type of cart.	Weight carried.	Draft required.	Weight carried.	Draft required.
Bhadgaon Farm ..	Local cart ..	1,250 Lbs.	2 Cwts.	1,200 Lbs.	1 to 1½ Cwts.
	Ball Bearing cart	2,250 Lbs.	2 Cwts.	1,200 Lbs.	½ to 1 Cwt.
Jalgaon Farm ..	Local cart ..	20 Mds.	2½ Cwts.	20 Mds.	1½ Cwts.
	Ball Bearing cart	60 Mds.	2 Cwts.	40 Mds.	1½ to 2 Cwts.
Surat Farm ..	Local cart ..	18 Cwts.	182 Lbs.	..	....
	Ball Bearing cart	18 Cwts.	126 Lbs.	..	....

From the above results it will be obvious that the introduction of ball bearings in cart wheels is certainly advantageous and economical and that a Ball Bearing Cart can carry practically double the weight which an ordinary cart can carry with the same draft. The sizes of local wheels in Khandesh, however, differ from those sent for trials and an attempt is being made to fit ball bearings on as many local cart wheels as possible with the contrivance specially made for the purpose. There is a demand for supplying two more sets of ball bearing wheels from North Central Division, one for the Agricultural School, Nasik, and the other for the Agricultural School, Dhulia.

Soil Scooper.—In all four soil scoopers have been so far prepared and sent out for exhaustive trials. Out of these, two are at the Dry Farms

at Sholapur and Bijapur and the remaining two have been sent to North Central Division. The scooper at Sholapur has done good work and has stopped erosion to a great extent. The trials with other machines could not be successfully carried out on account of unfavourable condition of the soil. These will be given further tests and the results reported in the next year's report.

Groundnut Raiser.—As stated in the last year's report, the Gujrat harrow was fitted with wheels in two suitable positions and sent to Gadag in Dharwar District for exhaustive tests on raising groundnut along with the wheeled digger made at the Shops. The trials were conducted by the District Agricultural Overseer, Gadag in Mundargi Peta, on red and stony soils on creeping variety of groundnut in the month of November 1935 with the help of a mechanic sent from Poona. According to his report it appears that the fitting of wheels on the Sayan harrow has not made any appreciable improvement in the machine and it did jump and did not work satisfactorily. The performance of the wheeled digger which was worked side by side with the local harrow, in the presence of many cultivators and Revenue Authorities, was greatly appreciated by them all. The local harrow had a blade 34″ in length while the wheeled digger was fitted with a blade 26″ in length. A six hours test indicated that both the machines dealt with the same area, i.e. 1 acre and 30 gunthas each, while the draft required for the local harrow was 3½ to 4 cwts. and that required for the wheeled digger was 3 to 3½ cwts. in sandy soil. Certain improvements in the machine have been suggested and they will be carried out and the machine given further tests in the next harvesting season.

Ring Cutting Machine.—Further improvements in the Ring Cutting Machine supplied to the Cotton Breeder at Surat have resulted in increasing its capacity to a great extent and he now finds it more economical to cut the rings with the machine than the usual method of cutting them with a pair of scissors which cuts only 21 tolas to 40 tolas of 24° wire with the machine.

With thicker wire the outturn is decreased in proportion and experiments to improve it further are in progress.

Erection of Machinery and New Constructions.

The following gives a short account of special constructions undertaken and machinery erected by this Section during the year under report :—

(1) *Glass House.*—At the request of the Plant Pathologist to Government an all-steel Glass House, measuring 35′ in length, 10′–6″ in width and 10′ in height, has been erected at the Agricultural College, Poona, for observation of plants under different conditions. The house is divided in 5 bays and is provided with dwarf brick walls, 3′–6″ in height and the remaining portion is covered by two rows of steel sashes fitted with glass, and 2 windows one opposite the other is placed in each bay for ventilation. The whole frame work is of steel throughout

and the roof is covered with glass also. Suitable ventilators are provided in the brick work also for a sufficient air supply and the central bay of the roof is arranged to open upwards in case of need. The house is provided with a reinforced concrete working table, 3′ × 34′ on either side, for keeping the pots and a 4′ passage is kept in the centre. It is provided with a door in each end and slabbed inside as well as outside.

(2) *Soil Temperature Tank House.*—The old 3 bayed house has been now extended and made into a 5 bayed house. The expanded metal on the sides has been replaced by dwarf walls like the above house and glazed sash work of teak. It is provided with 2 doors, two long platforms to accommodate soil temperature tanks, a reinforced concrete working table and two sinks. It is also slabbed inside as well as outside and provided with glass roof and steel frame work.

(3) *Graduate Quarters and Bullock Shed at the Cereal Breeding Station, Niphad.*—At the request of the Crop Botanist to Government, a Graduate quarter, intended for two, was built at the Cereal Breeding Station, Niphad. It measured 23′ × 50′ exclusive of the verandah and provided 5 rooms to each occupant. The combined implement and bullock shed is of steel throughout and measures 22′ in length, 23′ in width and 10′ in height. It is provided with a partition in the centre lengthwise in order to divide the shed into two parts, one for keeping the bullocks and the other for storing implements.

(4) *Poultry Runs and Pens.*—At the request of the Live Stock Expert to Government, a poultry run measuring 60′ long, 90′ wide and 7′ high with a partition wall, in the centre, was made at the Poultry Farm with necessary doors. The walls were finished with galvanised wire netting ½″ and ¾″ in mesh. Two poultry houses measuring 8′ × 5′–2″ × 4′ were also built for use in this run.

(5) *Pumping Plant at Kharadi on river Patalganga.*—This consists of a 5 BHP Lister 4 cycle crude oil engine and a 2½″ Gwynnes Centrifugal Pump with 3″ suction and delivery pipes. They are both fixed on cement concrete foundation and housed properly with a suitable shed. The capacity of the pump is 175 gallons per minute and the lift is 25′ only. It is financed from the Village Uplift grants and will be useful for 8 to 10 agriculturists.

(6) *Hindustan Water Lift.*—This is also fixed on river Patalganga at Vayal of Taluka Karjat and driven by two bullocks. The capacity is 4,500 gallons per hour and the lift is 23′ only. This is the first attempt of fixing a Noria on river and it is understood that there will be some more in the near future, all financed from the Village Uplift grants.

(7) *Cane Crushing Plant at Ozar.*—At the request of the Kadwa Canal Irrigators' Association at Ozar, district Nasik, a self-contained combined cane crushing plant has been installed for actual work in cane fields, consisting of a 9·5 BHP Hindustan Crude Oil Engine made

at the Hindustan Engineering Works, Satara, and the "Vasant" Sugarcane Mill made by Messrs. Kirloskar Brothers, Ltd., Kirloskarwadi, district Satara. Both are mounted on a semi-portable steel frame and run by a belt together with a 1" Juice Centrifugal Pump which throws the juice straight into the storage pan. The capacity of the mill is 2,200 lbs. of cane per hour and the extraction goes up to 70 per cent. The whole unit is shifted to different centres according to needs.

Miscellaneous Works.

There was a considerable amount of miscellaneous work done by this section during the year under report and a list of the important ones is given below in brief :—

1. Repairs to the weighbridge at the Agricultural College Dairy, Kirkee.

2. Repairs to the G-3 Calyx Drill belonging to the District Local Board, Satara.

3. Pumping out water from the well at the Criminal Tribe Settlement, Mundhawa, with a power pumping plant.

4. Repairs to Transpirometer belonging to the Sugarcane Research Station, Padegaon.

5. Repairs and overhaul to the bullock-gear at the College of Agriculture, Poona.

6. Construction of transmission models for the Professor of Agricultural Engineering, College of Agriculture, Poona.

7. Repairs to the bore-hole pumps at Bankapur, Karjat, Niphad and Bijapur Farms.

8. Repairs to the engine and crusher at Arbhavi Farm.

9. Help to Mr. Javalekar in repairing his pumping plant.

10. Training of 2 men in boring for the Bhopal State.

11. Loan with erection of a 7 BHP Oil Engine to the Agricultural College Dairy.

12. Repairs to the Gas Plant at the College of Agriculture, Poona.

13. Construction of a Mortar and Pestle for the Laboratory at Padegaon.

14. Repairs to the Hot Air engine belonging to the Agricultural Chemist to Government.

15. Repairs to the engine parts belonging to the power chaff-cutting plant in Khandesh.

16. Repairs to the Fordson Tractor at Chharodi Farm.

17. Repairs to prunning shears and chaff-cutter from Modi Bag and Agricultural College Farm.

Hire and Sale of Boring Machines.

There was a considerable demand for boring machines on hire due to failure of rains and 23 machines including 7 Exploratory hand machines, 7 Musto power machines and 9 Calyx rotary drills were hired out to different people as detailed below, out of which the Kolhapur Darbar alone requisitioned for 9 machines.

The Kolhapur Darbar	9
Mr. K. S. Shintre of Nasik	2
Khan Bahadur Abdul Latif, Sholapur ..	1
Dr. Irani of Bombay	1
The Leper Asylum, Kondhwa ..	1
Mr. Khare of Poona	1
Mr. M. H. Bijapur of Kerur ..	1
Mr. G. B. Gokhale of Ranibennur ..	1
Messrs. Marsland Price & Co. Ltd., Kalamb (Sugar Factory) ..	1
Mr. Torpy at Bombay	1
Messrs. Manahar Brothers, Bombay ..	1
The Belgaum Borough Municipality ..	2
The Saundatti Temple Committee ..	1
Total ..	23

In addition to the above machines, one hand machine was given to Mr. D. R. Vaidya at Kharati in Peta Dhond in connection with village uplift work, free of charge.

Out of the above, the boring made at Kolhapur and at the Leper Asylum is worth a mention. Out of the 29 bores made at Kolhapur, 17 were successful. They are fitted with bore-hole pumps, out of which 14 are hand and 3 power. The aggregate quantity of water delivered by these bores was sufficient enough to give a considerable relief in getting fresh water to the people at Kolhapur, especially during dearth of water and in time of cholera epidemic. The boring at the Leper Asylum was made with a Musto Power Boring Machine to a depth of 40′ from surface on a spot located by the water diviner and the water finding machine on an altitude of 2,250′ above sea level at Kondhwa near Poona. Water was first struck at 17′ below surface with a feeble current and a stronger current was met with at 26′ below surface, and it raised to a depth of 17′ when the bore was taken to the required depth. A test with a hand pump indicated that the water level in the bore used to remain constant in spite of pumping out 400 gallons of water per hour and when a petrol

driven power pump was installed the bore continuously gave a discharge of 900 gallons per hour. The Leper Asylum is considering to install a power pump on the bore as a permanent measure.

The total number of machines sold to different parties amounts to 8 as detailed below :—

Janjira State	2	One hand and one Musto Machine.
Bhopal State ..	2	One hand and one Musto Machine.
District Local Board, Andheri.	1	Musto Power Machine.
Agricultural Engineer to Government, United Provinces, Cawnpore.	3	Two Musto Power and 1 Hand Machine.
Total ..	8	

Hire of Pumps.

The following pumps were given on hire to different people :—

(1) 1¼" Myers bore-hole pump to Mr. Khare at Poona for use on a bore-hole.

(2) 2½" Pulsometer Centrifugal Pump type K to Mr. Khartude of Patas, Peta Dhond for irrigation purposes.

(3) 1¼" Myers bore-hole pump to the Temple Committee at Devergud, District Dharwar, for use on a bore 250′ deep.

(4) 2½" Ruston Centrifugal Pump to Mr. Khurjekar for irrigation purposes.

(5) Double barrel hand force pump to Mr. L. K. Ranade at Poona for emptying his well.

(6) Double barrel hand force pump to Mr. P. N. Shitole of Bhamburda for emptying well.

Defibration of Cotton Seed.

The DeSegundo Defibrating machine installed at Palej in Broach District was worked during the last ginning season on fixing the Lint Chamber in position. The machine has got a continuous action and takes out the fuzz on cotton seeds very efficiently. Its out-turn chiefly depends upon the degree of defibration and ranges between 100 lbs. per hour in case of black or entirely defibrated seed and 500 lbs. per hour in case of white seeds bearing a little fibre. As there was a difficulty as regards

the disposal of the fuzz and the defibrated seed, only 3 tons of cotton seed was treated in the machine with the following results :—

	Quantity Lbs.	Percentage. %
Black seed (completly defibrated seed).	4,020	59·86
Semi black seed (defibrated seed with a little percentage of fibre).	590	8·77
White seed (defibrated seed having a very thin layer of fibre).	536	7·97
Seed from Lint Chamber (blown with the lint).	257	3·82
Lint or fuzz	661	9·83
Husk or broken seed ..	503	7·48
Dust etc.	153	2·27
Total ..	6,720	100

The germination test has revealed that entire defibration damages the seed and affects germination, while the oil test with a rotary oil mill has given an extraction of 4 per cent. on crushing the meat only with a little percentage of husk. Wholesale defibrated seed did not give out a drop of oil when pressed in a rotary mill. The test with an oil expeller has, however, given very encouraging results and proved that wholesale defibrated seed with a preliminary crushing and heating can give out oil from 11 per cent. to 13 per cent. depending on the amount of fuzz existing on the seeds. The experiments will be carried out on a larger scale next year in order to obtain more conclusive results.

General.

The staff in general has done exceedingly well in spite of excessive pressure of work. The financial positions is also greatly improved owing to greater sale of boring machines and stores and greater number of machines being on hire. The total receipts amount to Rs. 27,980-10-8 as detailed below :—

Rs.	a.	p.	
14,396	10	0	Sale of Boring Machines.
5,214	1	10	Sale of Boring tools and parts.
7,906	0	0	Hire on Boring Machines.
463	14	10	Hire on pumping plants, and other small machines.
27,980	10	8	..Total.

The above receipts are calculated from July 1935 to June 1936 and they do not include the cost of material supplied and repairs undertaken for departmental institutions which approximately amount to Rs. 415-15-3.

C. G. PARANJPE,

Agricultural Engineer to Government,
Bombay Presidency, Poona.

Programme of work under the Agricultural Engineer to Government, Bombay Presidency, Poona, for the year 1936-37.

(1) Research on implements including their design, modifications and tests.	(*a*) Modifications and tests with wheat and cotton seed drills, Winnowing fans, Groundnut Digger Soil Scooper, Ball Bearing Cart wheels, etc., etc.
	(*b*) Design and manufacture of a Bunding Implement for use with tractor.
	(*c*) Design for an egg testing apparatus.
(2) Famine Pumping	(*a*) Inspection of Pumping sites on big rivers in the Presidency for growing fodder.
	(*b*) Keeping of 7 Famine Pumping Sets in readiness.
(3) Advice and Help	(*a*) Training of cultivator students in driving of engines and pumps.
	(*b*) Periodical inspection of agricultural machinery.
	(*c*) Advice to cultivators in agricultural machinery.
	(*d*) Advice to Divisional Officers in machinery matters.
	(*e*) Survey of sites and supply of drawings and estimates.
(4) Higher Technical Assistance	(*a*) Help to Divisional and other Departmental officers in case of repairs and breakdowns.
	(*b*) Erection of big plants and departmental structures as under :—
	(*i*) Erection of new engine and pump at Arbhavi Farm.
	(*ii*) Erection of new engine and pump at Nadiad Farm.
	(*iii*) Erection of the office and Non-Graduate Quarters at Niphad Wheat Breeding Station.

(5) Special Works	(*a*) Construction of two Glass Houses and a Potting Shed for the Plant Pathologist to Government.
	(*b*) Construction of Tobacco Curing and Drying House at Nadiad and a Cattle Dip at Chharodi Farm.
	(*c*) Further trials and tests with the DeSegundo defibrating machine at Palej.
	(*d*) Election of water lifts on river Kundalika in connection with the Village Uplift work.
	(*e*) Construction of a New Store Shed for the Agricultural Engineer's Workshops.
(6) Running of Plants	(*a*) Workshops and Experimental Well.
	(*b*) Motor Plough for private individuals if hired out.
(7) Sale and hire of machines	(*a*) Sale of boring machines their spares and tools.
	(*b*) Hire of Boring Machines.
	(*c*) Hire of Pumping Plants.
	(*d*) Sale of other stores, tools and plants.
(8) General	(*a*) Routine work pertaining to office Workshops and Divisions.
	(*b*) Charge and maintenance of the following :—
	The Nangaon Pumping Plant.
	The Boring Machines at the 3 depots.
	The Power Baling and Bruising plant at Karajgi.
	The Steam Plough.

C. G. PARANJPE,

Agricultural Engineer to Government,
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APPENDIX N.

ANNUAL REPORT OF WORK DONE UNDER THE HORTICULTURIST TO GOVERNMENT, BOMBAY PRESIDENCY, POONA, FOR THE YEAR 1935-36.

I. ADMINISTRATION.

There were several changes in the personnel of this section. Mr. P. G. Dani was taken as Fruit Expert by the Government of United Provinces while Mr. S. S. Bhat was deputed to Baroda as Horticulturist. Consequent on the deputation of these two officers, Mr. S. R. Gandhi was appointed as Superintendent, Ganeshkhind Fruit Experiment Station, Kirkee and Mr. B. Nazereth as Superintendent, Modibag. Mr. S. K. Patwardhan was deputed as Vegetable Expert under Sir Sassoon David Trust Fund. Mr. R. S. Dubhashi was transferred to this section from Nasik. Mr. I. A. Sayed was transferred back to this section from Kumta Farm and was posted as Demonstrator in Horticulture. Mr. S. R. Dhareshwar was newly entertained as Agricultural Overseer at the Ganeshkhind Fruit Experiment Station, Kirkee.

II. EDUCATION.

There were fifteen students with Advanced Horticulture as their optional subject for the B.Ag. degree. Of these, only two failed in Advanced Horticulture at the B.Ag. examination held in March 1936. The practical training class at the Ganeshkhind Fruit Experiment Station, Kirkee, attracted thirteen students and two graduates were taken up for special training in Horticulture at the Modibag. Practical work in fruit canning and preserving for the Advanced Horticultural Students was carried out under a great handicap for want of adequate equipment. It is indeed a matter of gratification that some of the provinces and Indian States have their Horticultural experts from among those trained in this section either wholly or partially.

III. RESEARCH.

1. *Laboratory.*

The laboratory badly needs equipment on modern lines to facilitate further research. Repeated requests for the grant have unfortunately failed. It is, however, noteworthy that students from all parts of the country were attracted to receive their training in canning and fruit preservation. Some samples of canned and bottled products were also examined and opinion given. Observations on dried karwanda for its suitability for distillation are under investigation at present.

2. *Cold Storage.*

It is now conclusively proved that 45° to 48°F temperature is the best for the storage of mangoes. Under this temperature, Alphonso keeps well for fifty to sixty days. Twenty-seven varieties of mangoes from different provinces were tested for their keeping qualities. Alphonso

is found to be the best from the point of view of storage though Peter from Madras, Fazri Jafrani from U. P., Pairi, Cawasji Patel and Fernandes from Bombay gave promise of good keeping quality. A study of the chemical composition of green and ripe fruits showed that high acidity is associated with long storage life.

It was also found that 40°F is the optimum temperature for the storage of Nagpur oranges and they keep well at that temperature for three months.

The research was extended to Malta oranges from the Punjab, the seed potato and the Banana.

Schemes for the extension of Cold Storage Research for a further period of three years and the institution of Gas Storage investigations have been submitted to the Imperial Council of Agricultural Research for consideration.

3. *Vegetable Selections.*

(*a*) *Chillies.*—The best selections namely No. 13-21 (thin skinned) and 53-18 (thick skinned) have given 6 and 42 per cent. increase respectively over the locals in yield under dry conditions. The former is not very significant while the latter has been found to be significant. The salient features of 13-21 selection, however, lie in its less number of seeds, greater pungency and better appearance. In green weight, this selection shows an increase of 40 per cent. over the local.

(*b*) *Brinjals.*—The Gote variety No. 28-21 has given an increase of 19 per cent. over the local thus showing its significance. The results need further confirmation.

Work at the Ganeshkhind Fruit Experiment Station, Kirkee.

1. *Mango Manurial Trials.*—The stock plants have been raised and they are in the process of being grafted.

2. *Banana Variety Trials.*—The local Walha variety was compared with the Basrai with the object of determining their fruiting capacity and the income they would fetch. Two experiments—one of single bunch comparison of the two varieties and the other to estimate the total income that can be derived from either of them during a period of about 3½ years was laid out by the A B B A method. The single bunch comparison showed that Basrai is superior to local Walha by 28 per cent. in the number of fruits in the bunch. Observations on the other are in progress.

3. *Banana Manurial Trials.*—Manures like Ammonium sulphate, bonemeal, castor cake, potash and their combinations were tried. Treatment of F.Y.M. (O. 4N) was kept as control but was also used as a basic manure in combination with other manures so as to have a total contents of O. 8N. It was found that the treatment of F. Y. M. and castor cake gave high yield (number of fruits) to an extent of 8 per cent.

over the control. The same treatment shows 13 per cent. superiority in the weight of the bunch.

4. *Mosambi Manurial Trials.*—The results are not yet in hand but the work is in progress.

5. *Improvement of Guava by Selection.*—Lucknow No. 49 has maintained its superiority over all other selections.

6. *Improvement of Pomegranate by Selection.*—G. B. No. 1 is the best selection in hand. Other selections viz: 97-14, 101-20, 133-47 and 133-50 are found to have soft seeds and are promising.

7. *Cultivation of Foreign Fruits.*—It is observed that the cultivation of Marsh Grape fruit has given satisfactory results at the Ganeshkhind Fruit Experiment Station, Kirkee. The plants appear to bear fruits profusely and the fruit is gaining popularity among all shades of customers. Apparently there is a good demand for this fruit.

8. *Propagation of Plants.*—Efforts are being made to work out the technique of top-working of mango trees by detached scions and layering of seedless Guavas by new process adopted from East Malling, England.

9. *Methods of Irrigation.*—The problem of irrigation by furrow method versus the basin method is being closely investigated.

Work at the Modibag.

As reported last year the garden is now made a commercial concern. The progress of mango stocks and grape seedlings is the only item of experimental interest though there are no results at present to report. Grape seedling selection No. 94 compares favourably with the Bhokri but due to seed contents it is to be seen how it will be taken up by the public.

A serious trouble was caused to the mosambi plants by the fusarium species. With the destruction of these plants, a valuable source of income is lost.

It is very much regretted that out of the programme of work for 1935-36, the grading of oranges could not be undertaken for want of adequate staff as the present members had to attend to a lot of increased work both at the Head Quarters and in the District. The work will, however, be undertaken during the ensuing year.

The total credits from this farm during the year amounted to Rs. 4,930 as against Rs. 4,800 of the last year.

(IV) Agricultural Service and Propaganda.

1. *Fruit Market Studies.*—As a result of market enquiry, the Government of Bombay is considering the question of appointment of a Provincial Board. A good deal of improvement in the wholesale market is noticed. The railway freight concessions are also extended to another year. Reduction in Steamship freight charges has given a good relief to the mango traffic from coastal tract.

2. *Registration of Nurserymen.*—It has been decided to run a model nursery at the Ganeshkhind Fruit Experiment Station, Kirkee, before any move is made and the work is under way.

3. *Advisory Work.*—The district work of this section consists of (*a*) rendering technical advice, actual demonstration in the matter of selection of site for orchards, their renovation, grafting and budding and assisting in the control of pests and diseases, (*b*) holding of classes for training in horticulture, (*c*) horticultural demonstrations at fruit shows and (*d*) replying querries by correspondence.

With the inauguration of village Improvement Scheme, this section is called upon to undertake enormous advisory work both by visits and correspondence.

During the year under report, technical advice was rendered in the Districts of Poona, Nasik, Satara, Sholapur, Ahmednagar, Dharwar, Khandesh, Thana and Kolaba. Budding and grafting were done at a large number of places. Horticultural instructions were imparted at six places in classes held at Bassein, Pen, Gokak, Chaundhana, Chahardi and Karjat attended by 200, 50, 60, 45, 65, and 50 pupils respectively. Three Horticultural Stalls were arranged at the Bijapur district Agricultural and Cattle Show, the Asoda Show and the Fruit and Flower Show at Mahableshwar. Jam and jelly making and lime juice extraction were demonstrated at these stalls. Besides, technical advice was rendered in the matter of fruit cultivation and nursery to the Nasik Road Central Prison and the Proposed School of Agriculture and Rural Vocations at Nasik. In all 1,106 querries were replied and this fact evidently shows that the cultivators and even well-to-do landlords are paying greater attention to this side of Agriculture and approach this section for the solution of their technical difficulties in gardening. There is a steady increase in the acreage under fruit cultivation.

The need for additional staff for this work is, therefore very keenly felt in order to organise and carry out work more thoroughly.

4. *Utilisation of Varkas Lands.*—It has been observed that Kaju and Karwanda would be the most suitable crops for the varkas area. Kaju will suit the parts to the south of Bombay and Karwanda to the Desh and Ghat districts to the north of Bombay. The establishment of a distillery at Malwan has already given an impetus to the cultivation of kaju there and it is hoped that the knowledge of the use of dried karwanda will enable varkas areas to be brought fully under this crop in the near future.

V. *Publications.*

1. G. S. Cheema.—

Recent Progress in Fruit Growing in India and Abroad. Agri and Livestock in India, Vol. V. Part V, 1935.

2. I. A. Sayed.—

Chimera in Pineapple.

Current Science, Vol. IV, No. 4, 1935.

3. R. S. DUBHASHI.—

Damage to Crops in the Nasik District by the Frost of January 1934.

Agri & Livestock in India, Vol. V, Part VI, 1935.

(Published while working under Deputy Director of Agriculture, N. C. D. Nasik.)

4. G. S. CHEEMA and S. S. BHAT.—

Banana Breeding at the Imperial College of Tropical Agriculture, Trinidad with a view to obtain a type resistant to Panama disease, including genetical and cytological studies on allied species.

Indian Jr. of Ag. Science, Vol VI, Part II, 1936.

5. Report on the Investigations relating to the Cold Storage of Mango fruit during the season of 1934.

In addition to these publications, six research articles and publications were reviewed.

Programme of Work for the year 1936–37.

1. Grading of oranges.
2. Manurial trials on mangoes, citrus and Bananas.
3. Variety trials of Bananas.
4. Testing of finally selected strains of Guava, Pomegranate and grape.
5. Introduction of new fruits—grape fruit, Italian lemon and Navel orange.
6. *Nurseries.*—Registration of Nurserymen and Seedsmen.
7. *Cold Storage Research.*—Testing of Alphonso mango grown in different localities and storage observation of fruits grown in other provinces.
8. Gas Storage experiments.
9. *Vegetable Research.*—Yield trials of finally selected strains of brinjals and chillies. Experiments to determine the extent of natural crossing in chillies and brinjals.
10. Plant propagation experiments.
11. Orchard irrigation experiments.

G. S. CHEEMA,
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Abstracts of Publications.

1. *Recent Progress in Fruit growing Industry in India and Abroad.*

This is the second of the series of popular articles for practical farmers on various agricultural subjects of general interest. After dealing with the importance of fruit growing, the author has dwelt on the lines of research, the fruit trade control, the need of agricultural co-operation and the trend of recent investigations in foreign countries and in India. He hopes that this done, fruit growing in India is bound to be a source of wealth to the Indian Agriculturist as in other countries.

2. *Chimera in Pineapple.*

The morphological characters of the chimera in pineapple plant are described. In vegetative characters the plant seems to have arisen from the Queen while the fruit characters reveal its origin from the Kew. It seems that the bud sport has retained its potentiality to mutate either towards the Kew or the Queen under favourable conditions.

3. *Damage to Crops in the Nasik District by the Frost of January 1934.*

This is an account of the effects of frost of 1934 on the crops in the Nasik District. The author has studied the temperatures during the period of frost, the tract and the crops affected and has suggested a few precautionary measures such as heating, irrigation and wind breaks pointing out that the advance information received from the Meteorological Department, Poona was accurate and useful.

4. *Banana Breeding at the Imperial College of Tropical Agriculture, Trinidad.*

This is a summary of work done by Professor E. E. Cheeseman and Mr. L. N. H. Larter as reported in the Empire Marketing Board's report of December 1931 and the Journal of Genetics.

5. *Report on the Investigations relating to the Cold Storage.*

Of the four varieties of mango investigated, the Alphonso and Peter mangoes showed satisfactory storage quality, the former being the best keeper. The storage life of Alphonso of " B " stage maturity was found to be 61 days at 45°F.

APPENDIX O.

Summary of work done under the Inspector of Agricultural Schools, Bombay Presidency, Poona, during the year 1935-36.

Charge.—The post of the Inspector of Agricultural Schools, Bombay Presidency, Poona, was held by Mr. V. C. Pavate, from the beginning of the year till 1st March 1936, when the charge was taken by Mr. R. Y. Hulkoti, who continued to hold charge till the end of the year.

Head-quarters.—The transferrence of office from Manjri Farm to Poona was effected at the close of the last year and the office was held in one of the small rooms in the office buildings of the Commissioner, Central Division, Poona.

Nature of work.—The nature of the work continued to be advisory both in respect of Vernacular Agricultural Schools which are under the administrative control of the Divisional Deputy Directors of Agriculture and in respect of the Agricultural Bias Classes which are under the administrative control of the various District School Boards financed by the District Local Boards with the help of the Government grants. The Annual Examination of the Vernacular Agricultural Schools was taken by the Inspector with the help of one of the Agricultural Graduates deputed by the Deputy Directors of Agriculture for the purpose while that of the Agricultural Bias Classes in so far as purely technical heads were concerned was taken up by the District Agricultural Overseers under the different Divisional Deputy Directors of Agriculture except in the case of Dharwar District in which case the Special Supervisor in charge of the Agricultural Bias Classes was entrusted with the work. One or two other Special Supervisors i.e. in the Sholapur and Bijapur Districts will shortly undertake the work and thus relieve the District Agricultural Staff in these districts from these duties as they have already been entrusted with multifarious duties. In the case of the Vernacular Final Examination with the Agricultural Course, the District Agricultural Overseers or the Head Masters of the Vernacular Agricultural Schools available in or near the Examination Centres were taken advantage of, in the case of purely agricultural and allied headings. When on tour, the Inspector met the various local officers of the Educational, Agricultural Departments, District Boards and also the local people and discussed the difficulties in respect of vocational and prevocational schools and made propaganda for the rapid spread of such institutions in rural areas.

Working of the Vernacular Agricultural Schools.—There were only two such Government schools in the Presidency proper under the Agricultural Department, one at Devihosur in Karnatak and the other at Dhulia in Khandesh. There is one special Agricultural School at Rajapur in Ratnagiri District conducted by a private body known as Shikshan Prasarak Mandal aided by the District Local Board, Ratnagiri, being recognised by the Educational Department.

Vernacular Agricultural School at Devihosur.—The Vernacular Agricultural School at Devihosur has been in existence since 1914. The school has still some difficulty in securing adequate number of suitable boys to the school though a stipend of Rs. 5 each per month is granted. There were only 15 applications for fresh admission during the last year but after deputing the Vernacular teacher to secure boys for the school some more applications were secured and 15 candidates were admitted. There were 17 students promoted from the I Year course to the II Year course of whom 3 left in the middle of the course. The total number of boys at the school at the end of the year was, therefore, 29. During the Annual Examination held in April 1936, the boys did well in all the subjects and only one student in the I year failed in the examination. The weaving and work-shop work was excellent as has been generally the case at this school. The school farm has been ably managed by Mr. T. N. Chaugule, the Head Master and the crops grown have appealed to the cultivators. He badly needs an assistant to help him in Farm work as the present fieldman is not fully available for field duties due to increased clerical work.

Vernacular Agricultural School at Dhulia.—The Vernacular Agricultural School at Dhulia is in existence since 1922. The school has been popular and getting many applications particularly on account of the facilities for admission into the Training College, Dhulia, and into service both under the Agricultural Department and the Taluka Development Associations and in the Primary Schools for the Agricultural Bias Classes. The Local Advisory Committee continued to do very good work by way of securing funds for the Boarding charges and making propaganda to secure boys for the school. In the Annual Examination held at the end of March 1936 the boys did well in the different subjects though there were few boys who were found weak in all the subjects. The poultry work, which is a speciality of this school, continued to be good during the year. But this engaged the greater attention of the Fieldman who could not attend to his field duties and give practice to the boys in the practical operations. Mr. S. S. Surve, the Head Master has managed the Farm ably and has added an attractive and profitable flower and vegetable section to this farm.

Vernacular Agricultural School at Rajapur.—The Vernacular Agricultural School at Rajapur has been in existence since 1929. The boys get a stipend of Rs. 5 per month and students manage their own Boarding affairs in group of a few boys. The school ge s limited number of boys from the Konkan Districts and has fulfilled to a certain extent the need for such a school for Konkan created by the temporary closure of the Vernacular Agricultural School at Jambul. The school gets help from Government in the form of Grant-in-Aid and also has secured this year a sum of Rs. 5,000 from the Sir Sassoon David Trust Fund. The school has been doing good work. The Annual Examination of this school could not be conducted this year by the Inspector. The School authorities report that out of the 15 boys, 10 passed in the Annual Examination. This school besides training boys in agriculture

and allied subjects has taken up training of primary school teachers for Agricultural Bias Classes required for Ratnagiri District and Sawantwadi State. There were 5 such teachers during the year under report. About 20 applications have now been received for admission to the regular course and there has been some inquiries too. This means that the school has no difficulty in securing the small number of boys required.

General.—The Vernacular Agricultural Schools have been of great help to the cultivators as many of the boys passed out of these schools have been doing excellent work on their own farms though a few of them, it is natural that some would go in service, have engaged themselves in service. Even in service they have been found to be of some outstanding merit when compared to their agricultural education. The difficulty in the way of increasing the number of such institutions has been that of finance. All such schools run small farms which also serve the purpose of research and field experiments and demonstrations. If a part of the farm expenditure which is now wholly debited to education is debited to research and propaganda and all the Government farms are in addition utilised for imparting agricultural education by providing one or two additional assistants for the purpose, a good number of boys from different parts can be trained with comparatively little additional expenditure for agricultural education in vernacular.

The supervision of past students' work which is necessary to offer help in respect of technical and other advice cannot be efficiently undertaken by the District staff under the Divisional Deputy Directors of Agriculture as they have at present multifarious duties unless their present charge is lessened or helped by Kamgars and their Travelling Allowance grant is increased. The Associations of the past students formed and brought into operation recently are still in their infancy and they need fostering by the Agricultural Department to encourage the boys in their work by solving their difficulties.

Working of the Agricultural Bias Classes.—There were in all 93 Agricultural Bias Classes of which 82 were managed by District School Boards, 6 by the different Mission Societies in the British area and 5 were in Indian State areas in the Presidency proper. When distributed according to the present educational divisions, there are under the different School Boards 29 Agricultural Bias Classes in the Southern Division with 4 districts, 29 in the Central Division with 6 districts, 12 in the Northern Division with 5 districts and 12 in the Bombay Division with 3 districts excluding Colaba. It will be seen that the Southern Division has got greater number of these classes per district and that Belgaum District has got the largest number viz. 13 classes. Kolaba District had no Agricultural Bias Classes. Looking to the working of these classes, it can be said that a few in each district have been doing good work depending on the personnel of the Agricultural Teacher and the facilities offered by the School Board in respect of additional staff to help the Agricultural Teachers e.g. Kougnolli, in the Belgaum District, Bhatkuniki in Bijapur District, Muhud-Budruk in Sholapur District, Ozar-Tambat in

Nasik District, Kanhur in Ahmednagar District, Asoda and Waghali in East Khandesh District, Godasamba and Dohad Boarding Schools in the Gujarat Division. In some cases e.g. Neelgund class, there have been only three teachers who are required to manage all the 7 standards and infant class. Since the nature of the Agricultural Bias Course is such as to demand more work from the teachers concerned, the restriction of number of teachers according to the scale depending on the number of boys attending the school, will act unfavourably on the efficiency of the Agricultural Bias Classes in purely rural areas where the schools are necessarily small ones with about 120 boys. In some classes e.g. at Bhatkuniki, the Head Master is the Agricultural teacher but his assistants are all untrained i.e. only Vernacular Final passed ; in such cases, it goes very hard to efficiently coach all the standards especially the Vernacular Final Class as the agricultural teacher will have too many subjects to attend to. The cost of running these classes has come in the way of rapid development of the Agricultural Bias Class movement. Attempts have been made to minimise the expenditure especially that on school garden since it forms a large proportion of the Agricultural Bias School budget and the Agricultural Teachers have been obliged to ask for only necessary expenditure. In this connection, it may be noted that a few of the classes named above are doing very good work and have credited nearly 60 per cent. of the expenditure incurred on school garden. Among these, special mention may be made of Bhatkuniki and Neelgund classes in the Bijapur District where the Agricultural Teachers have been able to get good produce. The nonincrease in the number of the Agricultural Bias Classes has led to the temporary stoppage of further training of agricultural teachers which has affected adversely the working of some of the Agricultural Bias Classes inasmuch as there are no other teachers to replace the inefficient teachers without closing their classes. In almost every district, there are one or two such inefficient agricultural teachers and the Boards have been obliged to continue their services for want of better hands not to speak of voluntary further development of the movement by some Boards e.g. Bijapur and Sholapur. It would be advisable if some more teachers are trained at the Devihosur and Dhulia Vernacular Agricultural Schools. In this connection, it may be mentioned that some of the Past Students of the agricultural schools and Vernacular Final (agricultural) students who are now working in Agricultural Bias Classes have been doing very good work. If such students are selected for Rural Training Schools for a year or two and Vernacular Final boys are then sent to Vernacular Agricultural Schools for further agricultural training they will be very efficient agricultural teachers. Some of the Rural Training School teachers already passed out have actually been found of great help to the agricultural teachers and if these teachers get further training in agriculture at the Vernacular Agricultural Schools, they will be very efficient agricultural teachers. As the matter stands at present, owing to the limited number of agricultural teachers and the Agricultural Bias Classes, even the present efficient agricultural teachers feel that they are under some punishment, since they cannot be freely transferred when necessary from one school to another nor can

they even take long leave as there are no other teachers to replace them. In some of the districts, all the Agricultural Bias Classes have now been kept specially under one Supervisor and the work in such cases has greatly improved both in quality and quantity. These Supervisors, however, need special training and arrangements for such training are being made during the ensuing year. There seem to be, however, certain difficulties in respect of Vernacular Final Examination with the Agricultural Bias. The District Agricultural Overseers are in charge of Agriculture, Nature-study and hand-work and the other subjects are given to the ordinary examiners, some of the papers being also common to the boys of ordinary Vernacular Final and Vernacular Final with the Agricultural Bias Course. I think it will be desirable if all the subjects of the Vernacular Final Examination (with Agriculture) are entrusted to the Special Supervisors in charge of the Agricultural Bias Classes since they are in touch with what is required and what has been taught to the boys in the Agricultural Bias Course.

Rural Training School.—There is great need of developing the Rural Training Schools in different divisions since there is only one such institution for the present for the benefit of Marathi-speaking people. The teachers from this school have been found to be of great help to the rural tracts and some of them have been doing very good work in the Agricultural Bias Classes in the Central Division, where they have been working. It is gratifying to note that one private institution of this type has been recently opened at Satara and has been recognised by the Educational Department. But unless the District Boards manage to offer these teachers some service, it does not seem likely that all the teachers so trained can be absorbed in Rural Uplift work, for which this private institution is primarily meant. If some private schools are encouraged in small areas and handsome offer of grant is made to such institutions in lieu of expenditure which the Boards would have incurred on this account, such teachers can be of great use in conducting small schools teaching up to IV or V Standards after which these schools will serve as feeder schools to the Agricultural Bias Classes opened in suitable centres and serving as group schools. The revision of the syllabus of primary schools and that of rural schools is still under the consideration of Government.

Rural Clubs.—These clubs have been recently started. They are still in their infancy. No individual home projects have been taken up. Only general things have been attempted. Competitions in different items of improvements will go a great way in developing such work.

Agricultural Education in High Schools.—There are two such High Schools that have included special agricultural course in their syllabus without affecting their usual course, viz. Rajapur and Bordi. Since a majority of boys attending High Schools in rural areas such as Bhalod, Yawal, Bhusawal, Bagalkot, come from rural areas and are from agricultural families, there has been demand from many of such High Schools for introduction of Agricultural Course in their High Schools. I think the Educational authorities would favourably consider the matter

and offer certain facilities in the form of decent additional grants since more expenditure will have to be incurred for such a course.

Text Books.—Great need has been felt for suitable text books. Some books have been written for the use of the teachers in Agricultural Bias Classes. But they have been freely used by the Agricultural Bias Class boys who owing to their inability to properly understand the subject matter have crammed some facts without really knowing what they have learnt. These text books are mainly meant for teachers who after gaining knowledge from a variety of books on different subjects should explain in brief the important facts with principles underlying them to students in a way that they can properly understand the same.

R. Y. HULKOTI,
Inspector of Agricultural Schools,
Bombay Presidency, Poona.

Poona, 28th July 1936.

Programme of work under the Inspector of Agricultural Schools, Bombay Presidency, Poona, for the year 1936-37.

(1) Inspection of the Agricultural Bias Classes of the Presidency proper.

(2) Inspection and Examination of the Vernacular Agricultural Schools.

(3) Watching the progress of the Vernacular Agricultural Schools and making the Vernacular Agricultural Schools as popular and economic as possible.

(4) To push forward the movement of the Rural Clubs and watching the progress of these clubs and that of the Past Students' Associations of the Vernacular Agricultural Schools.

(5) To offer advice to the Local Authorities and the officers of the Educational Department in the matter of starting more Agricultural Bias Classes.

(6) To watch how the syllabus, circular on by-industries, note on observation and standard time-table are being followed in the Agricultural Bias Classes.

(7) To supply the list of experiments to all Agricultural Bias Classes in different Vernaculars when asked for.

(8) To organise some conferences of the agricultural teachers and supervisors of some districts during my touring.

(9) To hold the Training Classes for the training of Special Supervisors and the Administrative Officers.

R. Y. HULKOTI,
Inspector of Agricultural Schools,
Bombay Presidency, Poona.

Poona, 28th July 1936.

APPENDIX P.

Summary of work done under the Professor of Agricultural Economics, Agricultural College, Poona, for the year 1935–36.

I—*Administration.*

1. Professor G. P. Patil worked as officiating Professor of Agricultural Economics.

2. Mr. K. M. Shah, B.Ag., worked as Demonstrator in Agricultural Economics in place of Mr. M. B. Ghatge, B.Ag., who proceeded for study abroad. Mr. K. S. Patel, B.Ag., worked as Investigator in Agricultural Economics.

II—*Teaching.*

3. During the year under report ten students had selected Advanced Agricultural Economics as their optional subject in their final year. Eleven advanced agricultural economics students including one old student appeared for the B.Ag. degree examination and eight came out successful.

4. The compulsory course in Agricultural Economics goes under the group " General Agriculture " and the result in agricultural economics cannot, therefore, be given separately.

5. Professor G. P. Patil delivered four lectures to the training class of land valuation officers, organised by the Co-operative Department, on the principles of land valuation and assessing net income of the agriculturists.

III—*Research.*

6. The year under report is the third year of research work in the Charotar tract of the Kaira District where the economics of mixed farming is being studied with livestock raising. A detailed report for the year 1934–35 was submitted last year. Thirty-one farmers were continued under observation in the year under report.

7. *Season.*—The monsoon broke out in the beginning of the second fortnight of June and good showers of rain were received. The farmers took opportunity of these rains for sowing cereals such as paddy, *kodra*, *vagardu* and *bajri* mixtures. These rains were followed by a complete break up to the end of that month. This break checked the germination of seeds and consequently some of the plots had to be resown. The broadcasting of tobacco seeds for raising seedlings was done during the last week of June.

In the first week of July, there were no rains but during second and third weeks heavy rains were received. Due to these rains, the inter-culturing and weeding operations were delayed and the tobacco seedlings

were destroyed in the seed-beds. There was a short break in the last week and the farmers completed the interculturing operations. The hairy catterpillars (*katras*) did some damage during this month to tobacco seed-beds and to the young plants of *bajri*, *til* and *tur*.

With the commencement of August, the transplanting of tobacco was begun, and a few farmers who had seedlings ready transplanted their tobacco plots even though there was no sufficient rains during the first fortnight. In the beginning of second fortnight good showers of rain were received and almost all the farmers successfully transplanted their tobacco plots. Henceforth there was a complete break till the end of this month, which made the farmers anxious about the rain.

Immediately after the 30th of August, the rains began again and continued up to the 16th of September with a heavy downpour of rain on the 2nd of September when a total of 3·42 and 3·01 inches were recorded at Anand and Borsad respectively for that day. The tobacco plots situated in low lying areas were overflooded and had to be transplanted again. The *bajri* crop which was almost ready for harvest was lodged down and its harvesting was delayed for about a week. In the second fortnight of September, the sky was practically cloudless and intense heat was experienced. Such a dry weather was harmful to tobacco crop.

A few showers at intervals in the month of October are usually considered very helpful to standing crops, but during this season, the period from the middle of September till the end of November was completely dry except on the 24th and the 30th of October when drizzling rains were received at Samarkha and Kasor. By the end of November, the tobacco crop was getting ready, and a few farmers harvested their tobacco plots. In the beginning of January severe cold was experienced and many farmers through fear of frost hastened to harvest their tobacco plots even though they were immature. Fortunately there was no frost during this season.

During February the sky was heavily clouded and there was drizzling rain on 17th, 27th and 29th of this month. This type of weather created favourable atmosphere for the spread of the disease—Powdery mildew of cumin—and most of the cumin plots were heavily infected.

On the whole the season from the agricultural point of view was fairly good.

8. *Farmers and their farm areas.*—Out of 31 farmers one farmer of Samarkha and the other of Nisaraya who were under our study, left farming at the end of the last agricultural year. In order to maintain the same number (31 farmers) under observation, two new farmers at the above villages were selected at the beginning of the agricultural year. During last year the 31 farmers cultivated 223 acres and 33 gunthas, whereas during the year under report 215 acres and 15 gunthas of land was cultivated by them.

9. *Capital.*—The analysis of capital position of 31 farmers at the beginning of the year indicates the following distribution of capital per farmer :—

	Per farm.	Per cent.
	Rs.	
A. *Fixed Capital*—		
(*a*) Land and its fixtures ..	2,780	61·3
(*b*) House and cattle shed .	1,754	38·7
Total ..	4,534	100·0
B. *Operating Capital*—		
(*i*) Livestock	145	36·6
(*ii*) Implements and tools..	45	11·4
(*iii*) Material on land ..	107	27·0
(*iv*) Cash on hand ..	40	10·1
(*v*) Amount due from others	59	14·9
Total ..	396	100·0

The total capital per farmer, therefore, comes to Rs. 4,930 while the average debt per farmer at the beginning of the year was Rs. 1,087.

10. *Crops.*—The distribution of the area under different crops on the 31 farms was as follows :—

Crop.	Area.	Percentage of total area.
	A. g.	
Tobacco	84 5	36·02
Bajri mixture ..	44 20	19·06
Paddy mixture ..	15 12	6·56
Kodra mixture ..	17 9	7·38
Vagardu mixture ..	38 31	16·60
Bavto	2 9	0·95
Sundhia (main crop) ..	13 10	5·67
Sundhia (2nd crop) ..	10 4	4·32
Cumin	5 13	2·28
Rai and *Asalio* ..	1 5	0·48
Grass land (*Padtar*) ..	1 24	0·68
Total area ..	233 22	100·00

Tobacco being the main money crop of this tract, the majority of the farmers keep at least some area for its cultivation. During this year 25 farmers had cultivated this crop on 84 acres and 5 gunthas of land

which forms 36·02 per cent. of the total cultivated area. Other important money crops are *jiru* (cumin) and *variali* (fennel) which are irrigated crops. The area under these crops have been considerably increased during this year owing to the fact that they had fetched high prices during the last two years. But it should be noted here that none of the farmers had cultivated *variali* during this year. The cereals (*bajri*, paddy, *kodra*, *vagardu* and *bavto*) occupied 118 acres and 1 guntha i.e., 50·55 per cent. of the cultivated area. *Sundhia* for fodder was raised on 23 acres and 14 gunthas. One of the farmers at Kasor had placed a small area under *rai* and *asario*.

11. *Yield.*—The statement given below will show the comparative yields of crops per acre for the last three years :—

Crops.	Average yield per acre during		
	1933-34.	1934-35.	1935-36.
Tobacco	527 lbs.	425 lbs.	526 lbs.
Bajri	500 „	570 „	704 „
Paddy	1,060 „	1,267 „	1,514 „
Kodra	840 „	962 „	1,165 „
Vagardu	1,110 „	1,159 „	867 „
Sundhia (main crop) ..	937 bundles.	623 bundles.	612 bundles.
Sundhia (2nd crop) ..	344 „	250 „	256 „
Tur	....	511 lbs.	637 lbs.

It is evident that better yields from *bajri*, *kodra* and paddy were obtained during this season in comparison with the previous two years. The yield of *vagardu* had strikingly gone down due to unfavourable weather which prevailed during its early growth. The average yield of *Sundhia* (main and second crop) which was grown for fodder was 612 and 256 bundles respectively. Tobacco and *tur* (grown in mixtures with cereals—paddy, *kodra* and *vagardu*) have yielded 526 lbs. and 637 lbs. respectively which show increase of 101 lbs. of tobacco and 126 lbs. of *tur* over last year's yields.

12. *Labour :—*

Labour requirement of crops.—The total labour required for growing crops on the 31 farms from the beginning to the end of the crops was

10,098·25 units of human labour and 2,862·25 units of bullock labour. The distribution of these units for different crops is given in the following table.

Crops.	Units of human labour used on total area under each crop.	Per cent. units of human labour used out of the total used on 31 farms.	Units of bullock labour used on the total area under each crop.	Per cent. units of bullock labour used out of the total used on 31 farms.
Tobacco ..	4,051·75	40·12	1,358·75	47·47
Bajri mixture ..	1,953·875	19·35	470·00	16·42
Paddy, *kodra* and *vagardu* ..	2,936·875	29·08	611·75	21·37
Sundhia (main crop)..	385·25	3·82	206·50	7·22
Cumin ..	257·5	2·55	54·0	1·89
Tobacco (Calcutty) ..	267·25	2·65	56·0	1·96
Sundhia (2nd crop) ..	83·5	0·83	66·0	2·31
Bavto ..	131·75	1·30	32·25	1·12
Rai and *asario* ..	30·5	0·30	7·0	0·24
Total ..	10,098·25	100·00	2,862·25	100·00

Further analysis of these figures indicate the average number of units of labour which were used per acre for some of the important crops during 1935–36.

Crops.	Units of human labour used per acre.	Units of bullock labour used per acre.
Tobacco (local) ..	50·32	16·92
Paddy, *kodra* and *vagardu* .	41·19	8·58
Bajri	43·91	10·56
Sundhia (main crop) ..	29·08	15·59
Sundhia (2nd crop) ..	8·27	6·53
Calcutty tobacco (*rabi* irrigated)	69·42	14·55
Jiru (Cumin)	48·36	10·14

13. *Utilisation of labour from different sources.*—Percentage of home labour, exchange labour and hired labour utilised on the farms under study was as follows :—

1935–36.

—	Home labour.	Exchange labour.	Hired labour.	Labour obtained grants.	Total.
Samarkha farms—					
Man labour.. ..	52·9	12·9	27·6	6·6	100·00
Woman labour ..	28·0	0·1	70·9	1·0	100·00
Bullock labour ..	44·3	28·7	8·7	18·3	100·00
Kasor farms—					
Man labour.. ..	53·5	11·0	25·6	9·9	100·00
Woman labour ..	56·0	0·5	43·4	0·1	100·00
Bullock labour ..	40·7	33·6	8·1	17·6	100·00
Nisaraya farms—					
Man labour.. ..	71·8	5·1	15·0	8·1	100·00
Woman labour ..	64·6	..	35·0	0·4	100·00
Bullock labour ..	62·8	26·1	0·6	10·5	100·00
All farms—					
Man labour.. ..	60·8	9·2	21·9	8·1	100·00
Woman labour ..	50·3	0·3	48·8	0·6	100·00
Bullock labour ..	50·5	28·9	5·4	15·2	100·00

It is seen that woman labour is hired more frequently than man labour. At Samarkha where the *patidar* women do not go to the fields the percentage of hired woman labour is found to be the highest *i.e.* 70·9 per cent. The percentage of bullock labour hired is very small. For the Charotar tract as a whole the percentage of woman labour hired is found to be more than double the percentage of hired man labour.

Utilisation of the available Man and Bullock labour force on the 31 farms 1935–36.

—	Total units available.	Labour units actually used for farm work.	Percentage of labour used for farm work.
Samarkha farms—			
Man labour	5,325·0	2,251·5	42·3
Bullock labour	2,378·0	896·5	37·7
Kasor farms—			
Man labour	3,550·0	2,023·0	57·0
Bullock labour	2,884·5	880·5	30·5
Nisaraya farms—			
Man labour	9,230·0	3,456·75	37·4
Bullock labour	4,394·5	1,542·0	35·1
All farms—			
Man labour	18,105·0	7,731·25	42·7
Bullock labour	9,657·0	3,319·0	34·4

It is seen from the table given above that only 42·7 per cent. of the available man labour and 34·4 per cent. of the available bullock labour are utilised for raising the crops. This need not lead one to the conclusion that men are idle for the rest of the period. The results of the day-to-day occupation of all the adult male members of the farm families are compiled in the following table :—

	Number of units.	Percentage of total available units.
Units used for farm operations	4,929·375	27·0
Units used for cutting and bringing *sheda* grass ..	1,437·25	7·9
Units exchanged	470·5	2·6
Units given gratis	317·0	1·7
Units used on hired work	1,439·75	7·9
Units used for miscellaneous work	4,102·75	22·4
Units used on social functions	1,154·5	6·3
Units without work	4,323·625	23·6
Units not available (days of sickness)	117·0	0·6
Total available units ..	18,291·75	100·00

Out of 18,291·75 available units 27·0 per cent. was used for actual farm operations, and 7·9% was used for bringing *sheda* grass from the fields. The units exchanged, given gratis and on hire work form 12·2 per cent. of the total available. It should be mentioned that farmers of this tract have to do other miscellaneous works such as looking after milch and draft animals, bringing green leaves of trees and weeds for feeding cattle, going round the fields for watching, cutting woods for fuel purposes, preparing ropes and many other such odd jobs on the farm which are indispensable and can be considered indirectly productive ones. For such petty works, farmers have used as much as 22·4 per cent. of the available units. The percentage of idle labour works out to be 23·6 while the units used for attending social functions are 1,154·5 *i.e.* 6·3 of the total available units.

Periodical utilisation of home bullock labour force of all the 31 farms during 1935–36.

	Total available units.	Total units employed.	Percentage of working to total available units.
From May 5th	761·5	313·5	41·17
June	850·5	633·75	74·51
July	868·0	566·0	65·21
August	868·0	454·75	52·39
September	840·0	261·25	31·10
October	866·5	317·0	36·58
November	817·0	145·0	17·75
December	777·5	135·0	17·41
January	793·0	100·25	12·64
February	764·0	104·5	13·68
March	830·0	151·0	18·19
To April 23rd	621·0	137·0	22·06
Total ..	9,657·0	3,319·0	34·40

It is seen from the table given above that June, July and August were the months of heavy work for the bullocks. During September the percentage of working units dropped down to 31·1. Again there was a slight rise in the month of October. Henceforth, *i.e.* from November it went on decreasing and reached as low as 12·64 per cent. in the month of January. From February onwards there was a gradual rise in the use of bullock labour.

During this season, 18 of our farmers maintained a single bullock each, 7 of them had a pair of bullocks each and the remaining 6 owned no bullock. Inspite of the fact that the majority of the farmers keep only one bullock they could not provide full time work to their bullocks.

On the whole during this year 3,319·0 units out of the total of 9,657·0 were used for all the work *viz.*, their own farm work, for "*Sundhal*" or even miscellaneous works such as hiring out to others or giving their services free of charge [ ] to friends and relatives.

14. *Milch cattle.*—Keeping of milch cattle is the secondary occupation for the farm families of this tract. Twenty-eight of the cultivators maintain one or more buffaloes for the production and disposal of milk and ghee while the remaining three did not keep buffaloes due to the fact that there were no working female members in their families who could look after the buffaloes.

Production and disposal of milk and ghee on the 31 farms.

(1) Total milk produced	.. ..	70,622·5 lbs.
(2) Milk sold	.. .. ..	37,405·25 „
		Rs. a. p.
(3) Price of milk sold	.. ..	1,629 14 0
(4) Milk used by farmers' families	..	9,510·25 lbs.
		Rs. a. p.
(5) Value of milk used by farmers' families	..	432 10 6
(6) Milk turned into curds for preparing ghee	.. .. ..	23,707·0 lbs.
		Lbs. ozs.
(7) Ghee obtained	.. .. ..	1,893 5
(8) Ghee sold	.. .. ..	959 13
(9) Ghee used for farmers' families	..	894 3
		Rs. a. p.
(10) Price of ghee sold	.. ..	570 8 0
(11) Value of ghee used by farmers' families	.	541 1 6

During this year the total quantity of milk produced by our farmers comes to 70,622½ lbs. Out of this quantity nearly 53 per cent. was sold at the creameries and 33·6 per cent. was turned into curds for preparing ghee while the remaining 13·4 per cent. was consumed by the farmers' families.

It is interesting to note that out of the above production 9,510¼ lbs. milk and 894 lbs. and 3 ozs. of ghee were used by the farmers' families. This works out on an average 4·44 lbs. of milk and about 17 tolas of ghee per month for each member of the families. [There are 180 persons (53 men, 52 women and 75 children) on these farms.]

15. *Costs and receipts.*—In the following statements the costs, receipts, family labour and business incomes from farming and dairying along with miscellaneous incomes are dealt with :—

The average farm business incomes from crops for the *patidar* and non-*patidar* farmers per farm are given below.

—	Per average farm.			
	Gross cropped area.	Value of yield.	Cost excluding wages of family labour.	Family labour income.	Farm business income.
	A. g.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Samarkha—					
Patidars ..	7 35·8	475 5 8·5	424 12 2	50 9 6·5	182 2 3·5
Non-*patidars* ..	7 24·5	364 0 3·75	326 3 11·25	37 12 4·5	79 1 8·5
Kasor—					
Patidars ..	6 7·7	332 2 11·3	341 8 3·3	—9 5 4	63 14 5·7
Non-*patidars* ..	8 11	269 11 3	277 7 6	—7 12 3	8 2 10
Nisaraya—					
Patidars ..	10 11·2	552 0 3	532 13 7·2	19 2 7·8	202 3 3·8
Non-*patidars* ..	6 28·8	382 4 4	306 4 2·2	76 0 1·8	174 0 7·5
All farms—					
Patidars ..	7 29	430 1 6	414 5 2·1	15 12 3·9	133 15 2·75
Non-*patidars* ..	7 7·5	365 6 4·9	310 14 6·9	54 7 10	124 7 0·5

The average farm business income per *patidar* farmer comes to Rs. 133-15-2·75 and for a non-*patidar* farmer it is Rs. 124-7-0·5. These incomes are nearly the same as they were during last year in spite of the fact that the yields from crops are higher than those of last year. This is due to the fact that the prices of agricultural produce have gone down during this season. Further it is found that these incomes are mainly made up of net rent and interest on working capital which form 88 per cent. in the case of *patidar* farmers and 56 per cent. in the case of non-*patidar* farmers of the total business income.

The following statement shows the average farm business income per unit of human labour supplied by the farm families of *patidars*,

non-patidars and of all the farmers of Samarkha Kasor and Nisaraya respectively :—

Village.	Castes.	Units of human labour supplied by the farm families.	Farm business income.	Average farm business income per unit of human labour supplied.
			Rs. a. p.	Rs. a. p.
Samarkha ..	*Patidars* ..	761·0	1,092 13 9	1 6 11·7
	Non-*patidars* ..	966·25	316 6 10	0 5 2·9
	Both ..	1,727·25	1,409 4 7	0 13 0·9
Kasor ..	*Patidars* ..	1,632·25	575 2 3	0 5 7·6
	Non-*patidars* ..	149·25	8 2 10	0 0 10·5
	Both ..	1,781·5	583 5 1	0 5 2·9
Nisaraya ..	*Patidars* ..	1,165·5	1,011 0 7	0 13 10·5
	Non-*patidars* ..	2,116·0	1,044 3 9	0 7 10·2
	Both ..	3,281·5	2,055 4 4	0 10 0·3
All the three villages.	*Patidars* ..	3,558·75	2,679 0 7	0 12 0·5
	Non-*patidars* ..	3,231·5	1,368 13 5	0 6 9·3
	Both ..	6,790·25	4,047 14 0	0 9 6·5

From the above statement it is found that the average farm business income per unit of human labour supplied by the farm families of *patidars*, non-*patidars* and of all the farmers is Rs. 0-12-0·5, 0-6-9·3 and 0-9-6·5 respectively.

The average income per unit of available family labour force works out to Rs. 0-2-7·3 which is found insufficient to feed and clothe the average family of 5·8 members (see statement below) in a standard considered essential by the people of this tract.

Family members.

Member.	Samarkha.	Kasor.	Nisaraya.	All of them.	Average per farm.
Men	17	11	25	53	1·7
Women	20	12	20	52	1·7
Children	22	22	31	75	2·4
Total ..	59	45	76	180	5·8

Each farmer therefore supplements his farm business income by maintaining milch buffaloes and from other miscellaneous sources such as rent of land given on lease to others, fruit trees, carting, preparing *bidis*, earning wages, service, *dalali*, watching and business. Out of the above all sources of incomes, only keeping of milch cattle is within the reach of almost all the farmers while the other sources cannot be explored by the average farmer of this tract.

16. *Dairy business income.*—The average dairy business income per farmer at Samarkha, Kasor and Nisaraya is Rs. 64-15-5, Rs. 18-5-5 and Rs. 40-8-5 respectively. The low income from dairying at Kasor is particularly owing to the fact that some of the farmers had to maintain dry buffaloes for a long period of the year.

Further analysis indicates that the average dairy business income for the non-*patidar* farmers is Rs. 54-6-6·7, while for the *patidar* farmer it comes to Rs. 34-0-2·65 which is less by Rs. 20-6-4.05 than the former one. The reason for this can be attributed to the fact that the non-*patidar* farmer feeds his buffalo on green leaves of trees, weeds and such others which cost nothing to him but the labour for bringing these materials. This in turn reduces the cost of production of milk and consequently increases the dairy business income. But such inferior feeding makes the animal constitutionally weak in the long run.

17. *Miscellaneous income.*—There is a good deal of difference between the *patidar* and non-*patidar* farmers, in the incomes earned from miscellaneous sources as the former has got better remunerative sources such as *dalali*, business, service and land, whereas the latter can take advantage of only those sources (earning wages, carting and preparing *bidis*) from which a very small income can be earned. The average income of the *patidar* farmer comes to Rs. 164-0-9·45 and of the non-*patidar* farmer it is Rs. 58-8-7·9. The increase in the income of the *patidar* farmer is mainly due to the income (from Africa) received by the farmer No. 4 of Nisaraya.

18. Total income from all the sources is compiled in the following table :—

——	Farm.	Dairying.	Miscellaneous income.	Total income.
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Patidars ..	133 15 2·75	34 0 2·65	164 0 9·45	332 0 2·85
Non-*patidars* ..	124 7 0·5	54 6 6·7	58 8 7·9	237 6 3·1
All farms ..	130 9 2·7	41 4 0·2	126 9 9·3	298 7 0·5

The average total income obtained per farm thus comes to Rs. 298-7-0·5, which, when distributed over the 5·8 persons per family, comes to Rs. 51-6-4 per capita per annum. This works out to annas 2 and pies 3·6 per day, per capita of the farm family members.

19. There seems to be an improvement in the average income per farm during the year under report when compared to the results of the two previous years as no frost occurred during the current year. The results of analysis have so far been extremely interesting, illuminating and of practical utility.

20. The results of the costing of 25 farms at and near Malsiras in the Sholapur District for three years are still awaiting compilation.

V—*Publications.*

Professor G. P. Patil	.. Valuation of Land. (The Poona Agricultural College Magazine, Vol. XXVII, No. 3, December 1935.)
Mr. K. M. Shah ..	.. *Teji-Mandi* Transactions. (The Poona Agricultural College Magazine, Vol. XXVII, No. 1, July 1935.)
Mr. K. M. Shah ..	.. Market Quotations and how to read them. (Poona Agricultural College Magazine, Vol. XXVII, No. 4, February 1936.)

G. P. PATIL,
Officiating Professor of
Agricultural Economics.

College of Agriculture, Poona :
16th July 1936.

Programme of Work to be done under the Professor of Agricultural Economics, Poona, during the year 1936-37.

1. Collation and interpretation of and writing up the report from the data collected at and near Malsiras during the three years 1930-31 to 1932-33.

2. Continuing the study of economics of mixed farming and livestock raising on the 31 farms of Charotar in the Kaira District of Gujarat.

3. Compilation of the data collected during the three years 1933-34 to 1935-36 in Charotar.

4. Teaching Agricultural Economics to the students of the College.

G. P. PATIL,
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16th July 1936.

APPENDIX Q.

Summary of Work done under the Professor of Agricultural Engineering, Physics and Mathematics for the year 1935-36.

Administration.

During the year under report I was on leave for 2½ months from 9th March 1936 to 23rd May 1936, when Mr. A. A. Vasavada acted for me. I was in charge of the office for the remaining period. The work of the section is threefold, viz. Teaching duties at the College, Research on Soil Erosion and District Enquiries on Land Development.

Staff.

In addition to the Lecturer and Demonstrator one additional temporary part-time Demonstrator was attached to this section during the year up to 20th February 1936 to cope with the additional teaching work due to the change in course reported upon last year.

I—Teaching.

Two subjects, viz. (1) Physics and Mathematics and (2) Agricultural Engineering, together with their laboratory and field work are taught by this section.

During the year under report the subject of Agricultural Engineering was taught to B.Ag. students according to the old course and also to the Second Year B.Sc. (Agri.) students according to the new course. The normal staff in the section was not able to cope with the additional teaching on account of the abovementioned duplication of teaching and hence a part-time temporary additional Demonstrator was provided to work in this section till the end of the second term, i.e. 20th February 1936.

From this year onwards the subject will be taught according to the new course and the course will be finished in the Second Year B.Sc. (Agri.).

The University results in the two subjects taught by this section during the 1936 examination were as follows :—

Physics and Mathematics.

—	Number appeared.	Number passed.	Per cent. passed.
F. Y. Sc. (Agri.)	80	46	57·5 per cent.

This year's batch of students was found to be weak.

Agricultural Engineering.

	Number appeared.	Number passed.	Per cent. passed.
S.Y.Sc. (Agri.)	42	41	97·6
B.Ag.	61	59	96·7

II—Research.

1. Study of Soil Erosion.

(*i*) 30-*Acre Plot near Chaturshingi Hill.*—The bottom and part of sides of the trenches below the duplicate four guntha and three guntha sub-plots were concreted and plastered with cement last summer to catch the silt.

There was heavy shower early in June. This did not cause overflow as the soil being light and dry absorbed all the rain. The heavy September and October showers caused overflow and erosion causing silt accumulation in the trenches below the sub-plots.

Silt at the rate of 5 to 6 tons per acre equivalent to an average depth of ·02″ was washed down from the cultivated plots and 7½ to about 9 tons per acre equal to an average depth of ·03″ from the uncultivated plots.

The plough furrows in the cultivated plots near the trenches were across the slope and the natural vegetation in the cultivated plots had finished its life before the heavy September showers. This is likely to have caused a comparatively greater quantity of silt removal from the uncultivated plots. The figures are only for one year and it would be interesting to note future results.

(*ii*) *Erosion in Gullys.*—Two gullys in the 30-acre plot which are under observation have also shown that their bed as well as banks are being erroded in general. Silt is deposited in the gullys at places where there are pockets due to drops or where the gullys have bends.

The bed gradients of the gullys tend to be steeper and change from year to year. The largest number of gradients range within the group 1 in 5 to 1 in 20.

(*iii*) *Steep Grade Lines.*—Two lines on steep slopes near the hill-side adjacent to the Erosion observation plot have been kept under observation. These lines, though having erroded soil at the surface show a slight degree of further erosion. The gradients along these lines have a tendency to slowly flatten out and lower in value in the range of flat gradients below 1 in 20. The gradients of the steeper group above 1 in 20 have

retained the same average value but show a slight tendency to decrease in number.

(*iv*) *Moderate grade Line.*—Another line on a moderately flat slope in the Kirkee Cantonment area adjacent to the erosion observation plot, which has been taken for observation shows a tendency almost similar to the lines mentioned above.

2. Katraj Valley Terrace Observations.

Observations on the hill side valley terraces to study the rolling of the soil show that erosion takes place both along and across the terraces.

The cultivators build up their terraces judging the levels by the eye. This gives inaccurate levels. Pockets exist in the terraces and the terraces have their own slopes both ways. The rainfall is heavier here than that met with in Poona and hence the heavy rainfall causes a general movement of soil of terraces, causing levelling and flattening out the terrace slopes. The pockets, however, are smoothened out. The erosion is more along the slope than across.

3. Divaghat Area Observation.

Five gullys in the forest area at the base of Divaghat have been kept under observation. Low dry stone bunds collected from the forest have been put up across these gullys and they had been showing silt filling. Of these, four gullys have shown good appreciable filling. The bunds of one gully were washed away and reconstructed later, so that no results could be obtained from this except in one of its terraces where no washing occurred.

The upper terraces show a higher rate of filling than the lower ones in the same gully. The fillings have flattened out the bed of the gully. The maximum filling in one of the gullies is 1½ ft. At a few special places there is some cutting. But the general filling in and levelling was evident.

4. Karjat Valley Terrace Observations.

Two lines have been selected in the rice terraces in a valley near Halivli village adjacent to the Rice Research Station at Karjat. One of the lines about 1,800 ft. long is along the slope of the valley, while the other one is across the slope and is about 1,000 ft. long. The rolling of the soil and washing due to heavy rains in this locality is under observation. The gradients flatter than 1 in 10 show a tendency to flatten out. The slope of the cultivated area in each terrace is very flat and the gradients are all flatter than 1 in 100.

5. Pashan Valley Terraces.

The Pashan valley near Bavdhan village is all terraced and dry crops are raised in this area. The erosion effect in this valley is taken up for study during the next year. Two lines have been selected for observation. One of them is about 260 ft. long and the other is nearly 600 ft. long.

6. Erosion in Gullys near Gujarat Rivers.

It was not possible to take up observations of Erosion in Gullys in deep soils, heavy and light soils near Gujarat Rivers for want of time.

7. Erosion and Silting observations in S. D. and S. C. D. through the agency of the Bunding Officers.

It was decided in the last Cresco that Messrs. Shirole and Desai may make observations under natural conditions on a site to be selected in consultation with the Professor of Agricultural Engineering, Physics and Mathematics, in their respective divisions. The Bunding Officer, S. C. D., has suggested a few places. The sites will be visited and the line of work fixed up with the Bunding Officer. The Bunding Officer, S. D., has not sent any report in this respect so far and the Deputy Director, S. D., has been approached in the matter.

8. Register of Land Development Schemes.

The undersigned has visited some typical places where erosion takes place and preventive measures adopted. Suggestions for modifications, where necessary, were offered.

9. Soil Erosion Bulletin.

The collection of material for writing up an exhaustive Bulletin on Soil Erosion and Land Development is taken in hand. A good deal of material is collected up. It is being sifted and collated. Specially, due to the duplication of teaching course in Agricultural Engineering, it was not possible to spare sufficient time.

10. Economic Wells, Tidal Bunds and Bhal Tract Lands.

The study of cost of ferro-concrete wells continues. The figures are being collected. The study of Tidal Bunds and Bhal tract land has been taken on hand.

III—Advisory and Propaganda.

The following work has been attended to in the District :—

(*A*) *North Central Division*—

The Deputy Director of Agriculture, North Central Division, Nasik, referred a few schemes and other items of Land Development mentioned below :—

(1) Survey and Layout of Bunds in the Maratha Boarding House area at Nasik.—The area was surveyed. Levels were taken and alignment for bunds and roads was given.

(2) Layout of Bunds at the Bhadgaon Farm.—The area was surveyed and levelled by the local staff. Advice was given on the alignment and layout of bnnds etc.

(3) Land Development Lecture at Chahardi.—The Lecturer in Agricultural Engineering was deputed to give lecture on Erosion control, Bunding and Land Development at an Agri-Horticultural class organised by the Deputy Director of Agriculture, North Central Division, Nasik, held at Chahardi in West Khandesh.

(B) Bombay Suburban Area—

(1) Dahisar Nadi Bunding Project .— This scheme was proposed by the District Deputy Collector, Bombay Suburban District, and was referred by the Deputy Director of Agriculture, North Central Division, for investigation. A preliminary investigation report has been submitted to the District Deputy Collector. The report is under the consideration of the Collector, Bombay Suburban District.

(2) The Horticulturist to the Government of Bombay also referred a scheme of terracing and layout for irrigation of fruit orchard belonging to Mr. Ali near Chembur. This scheme was worked out after levelling etc.

(3) Advice was also given to Dwarkadas Tribhovandas Sheth about erosion prevention in his fields at Kalvan near Chembur. This was referred by the owner of the Land while levelling was being done in Mr. Ali's plot.

(C) Poona District—

(1) In the Poona District the area of Sadhu Bhujbal Mali at Talegaon Dhamdhere was visited in company with the Bunding Officer and suggestions were offered with regard to Bunds, waste weirs and Nala diversion structure to him.

(2) Bhamburda Kuran Area in charge of the College Dairy has gullys, which are slowly working into the area and Tals built-up across it are being scoured at the lips of the gully falls. At the request of the Manager, Agricultural College Dairy, this area was visited and suggestions for protection, etc., have been offered.

J. P. TRIVEDI,

College of Agriculture :
Poona, 17th July 1936.

Professor of Agricultural Engineering,
Physics and Mathematics.

Programme of work under the Professor of Agricultural Engineering, Physics and Mathematics, for the year 1936-37.

The following work will be taken up during the year :—

(1) Further observations on the Erosion observation plot near the College.

(2) Observations in the Katraj valley.

(3) Diva Ghat Forest area observations.

(4) Pashan valley terraces.—It is proposed to take up observations in the Pashan valley from the Paud Road side, as time permits.

(5) Observations in the Karjat Rice terraces.

(6) Observation of Erosion in Gullys in deep soils, heavy and light soils near Gujarat Rivers, as time permits.

(7) Erosion and silting observations in South Central and Southern Divisions through the agency of the Bunding Officers.

(8) Advisory work in the Districts.

(9) Visits to various schemes and places for observations.

(10) Completion of the Central Record of works.

(11) Preparation of a Bulletin on Soil Erosion and Land Development.

(12) Studying the question of Economic wells, protective and tidal bunds and Bhal Tract land.

J. P. TRIVEDI,

College of Agriculture :
Poona, 17th July 1936.

Professor of Agricultural Engineering,
Physics and Mathematics.

APPENDIX R.

Annual Report of Work done under the Professor of Entomology, College of Agriculture, Poona, during the year 1935-36.

Administration

During the year under report I was in charge of this Section of Entomology.

Staff.

There was no change in the staff. The University in its report recommended the addition of one more graduate to the Section but it was not approved by the Director.

Work.

The work done by this Section is of three kinds :—

I. Teaching.
II. Investigations on important insect pests.
III. Advisory work and service to the Public.

I.—*Teaching.*

This was the 2nd year of the introduction of the new course for the B.Sc. (Agri.). The subject of Entomology has been transferred to the third year, so there were only two subjects to be taught—Zoology for the 1st year and Optional Plant Pathology for the last year B.Ag. class.

II.—*Investigation work.*

Investigations were carried on the following pests :—

I. Chillie Thrips.
II. Control of Cabbage Aphis.
III. Jassids on Figs.
IV. Betelvine bugs.
V. Citrus Scale insects.

(1) *Chillie Thrips.*—The chief points under study this year (1) to find out the effect of Virus free Thrips on healthy Chillie plants as were done last year and (2) to ascertain the effect of Virus affected Thrips on healthy chillie plants.

As for the first, no curling or mottling were produced though elaborate and exhaustive trials were made by introducing Thrips hatched out from the eggs.

While in the second case, curlings were produced on the 6th day of the introduction of the thrips, brought from the field from a Virus affected plant.

(2) *Cabbage Aphis.*—The work on this problem during the year under report was as follows :—

(1) To assess the damage due to aphis,

(2) To prove that home-made preparations of tobacco can be standardised to make them as effective as Black leaf 40.

(3) To prepare from the local material a contact insecticide containing the minimum amount of nicotine.

(1) To Assess the Damage due to Aphis.

To achieve this two plots of cabbage of about 10 gunthas each were grown in the Fruit Experimental Station, Kirkee. One of them was sprayed with Black leaf 40 and the other was left unsprayed. To avoid infection from the unsprayed plot, a plot of jowar was sown in between these two plots. In all two sprayings were given. Calculating for the same number of heads, the increase in the outturn from the sprayed plot is about 40 per cent.

(2) Home-made Nicotine Preparation to be Standardised.

The method of preparing the nicotine extract from tobacco waste from Nipani has been described in the last year's report. The material from Nipani locally known as Dhoos has always given a constant kill percentage (97 per cent.) as much as Black leaf 40, if this method of preparation is followed. The tobacco waste from Nipani does not seem to vary in nicotine content from year to year. If the material from Nadiad (Gujarat) is taken, the only difference in the method to be done is that no dilution by addition of water has to be done, but the extract has to be sprayed as such.

(3) The contact insecticides from tobacco are being prepared by the Industrial Chemist, Bombay. They will be given trials when ready. The price per gallon of these products is reported to be Rs. 27 to 28.

III.—*Jassids on Figs.* (Typhlocyba sp.)

The spraying trials were made but the incidence of the pest being very small the results were inconclusive.

IV.—*Betelvine Bug.*

This is a new pest taken up for study, but nothing more than some preliminary observation was made during this year. Betelvine is a very valuable crop. The area in the Presidency proper is about 5,000 acres. It is attacked by capsid bug which has been recently identified as "Disphinctus maesarum" Kirk. A scheme for investigation of this pest was submitted to the Trustees of the David Sassoon Trust Fund, but they were unable to provide funds for this scheme. The preliminary observations on this pest are :—

(*a*) These bugs are found to be present practically in all the gardens in this Presidency.

(*b*) No variety of Pan is known to be immune.

(*c*) The damage due to this pest varies from 10 to 40 per cent.

(*d*) These insects breed very slowly in winter months.

(*e*) The period of intensive attack varies in different places.

(*f*) All the stages are found on the plant; the eggs are laid in the tissue.

V.—*Citrus scale insects.* (*Chrysomphalus sonidum*).

To control this the fumigation of trees had to be attempted, and the inquiries from Messrs. Havero Trading Company, Bombay, have been made in that connection.

III.—*Advisory work and Service to the Public.*

During this year about 297 inquiries regarding insect pests were attended to by correspondence and by actual visits. Besides this help was rendered to the Institutions by way of supplying insect pests, Insect boxes, Silk worms, etc. A large number of proprietory products were received for trial and opinion, and some of them have been attended to.

The following table will give a clear idea of the variety of the inquiries received during the year :—

297 inquiries in all were received during this year from the public, from about 51 places. Not only that the inquiries were received from all over India, but even from places outside India like Siam, Russia, etc. The following is the classification of the inquiries. Insect pests of crops, (Cereals 22, Cotton 13, Fruit 42, Leguminus crops 8, Vegetables 16, Sugarcane 11, Betelvine 9). Animal pests (Pigs and Jackals etc.) 11, Apiculture 16, Lac Industry 3, Supply of Cochineal Insects 16, White ants 13, Insect Show cases and Entomological materials 18, Information regarding sprayers, Dusters, etc., 14. Trials of Insecticides 13, Sericulture 16, etc.

The number of inquiries have been the largest from the Poona District amounting to 75.

Service to the Public.

Besides this some Institutions and Agricultural Officers were supplied Insect Show cases, Silk worms, etc. The results of trials with the opinions were communicated to the various firms who sent their products for trial.

Advisory and Educational work.

I toured for 60 days and visited 29 places for advisory and investigational work. The Lecturer toured for about 36 days and visited 36 places. He lectured in vernacular at the Horticultural Classes.

Lastly I would like to remark that the staff worked enthusiastically and satisfactorily throughout the year under me. The necessity of a clerk is keenly felt as the work is increasing too much, and it is not possible to cope with that without the provision of a clerk.

T. N. JHAVERI,
Professor of Entomology,
College of Agriculture, Poona.

College of Agriculture,
Poona, 22nd July 1936.

List of publications.

There are no publications during the year 1935-36.

T. N. JHAVERI,
Professor of Entomology,
College of Agriculture, Poona.

Programme of work under the Professor of Entomology, College of Agriculture, Poona, for the year 1936-37.

1. *Chillie thrips*—

(1) To raise virus free thrips in the Laboratory.
(2) To introduce virus free thrips on batches of—
(*a*) Healthy, and
(*b*) Diseased plants.

Virus free thrips introduced on diseased plants and then transferred to a healthy plant,—the effect on the plant should be noted.

The experiment to be conducted at two different periods during the year (monsoon and winter).

2. *Control of Aphis on*—

I. Cabbage, and

II. Peas—by spraying the preparation from the tobacco waste product (Dhoos). The minimum number of spraying required to control it to be noted.

III. Citrus scale :—

To control scale insects by fumigation of Calcium cyanide for which a fumigation tent to be got prepared.

IV. Betelvine Bug :—

To undertake the investigation regarding the Binomics and control methods against this pest.

V. Leaf-hoppers on Figs :—

Experiments in connection with the control of these hoppers will be continued.

VI. Advisory work and service to the Public :—

Inquiries relating to the control of pests will be attended to as usual and necessary advice and help will be rendered.

T. N. JHAVERI,
Professor of Entomology,
College of Agriculture, Poona.

College of Agriculture,
Poona, 22nd July 1936.

List of Agricultural Bulletins published by the Department of Agriculture and kept for Sale at the Government Book Depot, Bombay.

No.	Year.	*Subject.*	Price. Rs.	a.	p.
32	1908	Locusts in India, by H. M. Lefroy, Imperial Entomologist, Pusa.	0	8	0
33	1909	Cultivation of Broach Cotton in Dharwar, by M. L. Kulkarni, Divisional Inspector of Agriculture, S. D.	0	4	0
34	1909	Night-soil—A Valuable Manure, by G. K. Kolkar, Assistant Professor of Agriculture, Agricultural College, Poona ..	0	4	0
36	1910	First Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency, by W. Burns, Economic Botanist ..	0	14	0
37	1910	An Examination of the Seed-Supply of the Broach District, by G. D. Mehta	0	4	0
39	1910	The Salt Lands of the Nira Valley, by Harold H. Mann, Principal, Agricultural College, Poona, and V. A. Tamhane, Laboratory Assistant, Agricultural College, Poona ..	0	5	0
40	1911	The Cultivation of Guavas near Poona, Dharwar and Limbgaon.	0	12	0
41	1911	Groundnuts in the Bombay Deccan	0	4	0
43	1911	An Examination of the Seed-Supply of the Broach District, Part II	0	5	0
44	1911	Preliminary Study of the Red Rot of Sugarcane in the Bombay Presidency	0	8	0
45	1911	Second Year's Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency	0	14	0
46	1911	Seed Selections Series I, Broach Cotton..	0	8	0
47	1911	San Hemp	0	4	0
48	1911	Poona Furnace	0	7	0
„	1911	Do. (Marathi)	0	6	0
49	1911	An Examination of the Seed-Supply of the Ahmednagar District, Part I	0	5	0
50	1912	An Examination of the Seed-Supply of the Ahmednagar District, Part II	0	3	0
51	1912	Third Year's Experiments in the Treatment of Grape-Vine Mildew	0	3	0
52	1912	Muscovado Sugar Machinery and its scope for Gul Manufacture in India	0	8	0
53	1912	A Method of improving the Quality of Cotton Seed ..	0	7	0
55	1913	An Examination of the Seed-Supply of the Poona District ..	0	3	0
57	1913	Improvement of the Indigenous Plough of Western India ..	0	12	0
59	1914	Common Salt and its use as Manure in the Konkan Division ..	0	3	0
62	1914	The Value of Castration of Deccan Bullocks	0	3	0
63	1914	Substitutes for Rab	0	3	0
64	1914	Alkali or Kalar Experiments and Completion Report of Daulatpur Reclamation Station in Sind	0	14	0
65	1914	A List of Diseases of Economic Plants occurring in the Bombay Presidency	0	4	0

No.	Year.	*Subject.*	Price. Rs.	a.	p.
67	1914	An Examination of the Seed-Supply of the Sholapur District ..	0	3	0
69	1915	The Rice Stem Borer in the Konkan	0	3	6
70	1915	Improvement of Cotton in the Bombay Presidency (except Sind)	0	3	6
74	1915	Well Waters from the Trap Area of Western India.. ..	0	6	0
79	1916	The Cultivation of Guavas in Gujarat	0	5	6
80	1916	List of Seeds available on the Agricultural College Farm, Poona	0	5	3
81	1916	Note on Fencing Construction	0	6	9
82	1916	Cultivation of drilled Paddy in South Bombay Presidency ..	0	8	0
83	1917	The Spice Gardens of Sirsi in Kanara	0	10	6
84	1917	Seed Selection Series—Kumpta Cotton	0	1	0
85	1917	Note on Cattle in the Bombay Presidency	0	11	0
86	1917	Establishment and Management of the Dairy Farm ..	0	7	0
87	1918	The Utilisation of Inferior Grass Herbage, Experiments at the Tegur Cattle Farm	0	9	0
88	1918	First Report on Fruit Culture as practised round about Tharushah (Sind) in Nawabshah District	0	2	0
90	1918	Work on the Manjri Farms for the years 1915-18	0	7	3
91	1919	The Cultivation of Berseem in Sind—Experiments at Sukkur ..	0	1	0
92	1919	Classification and Description of the Jowars of the Bombay-Karnatak	0	10	3
93	1919	Palm Gul Manufacture in the Bombay Presidency (principally Date Palm)	1	3	9
94	1919	The Sugarcane Borer and its Control	0	4	3
96	1920	Investigation into the nature of the Salt Lands of Sind ..	0	12	0
97	1920	Prickly-Pear as a Cattle Food	1	4	0
98	1920	Fruit Culture as practised near Shikarpur, Sind	0	1	6
99	1920	Rice Cultivation in the Larkana District, Sind	0	8	0
100	1920	Fodder Crops of Western India	2	1	0
101	1920	Fruit Culture in Palitana and Jamnagar	0	8	6
102	1920	Investigation on Potato Cultivations in Western India ..	1	15	0
103	1920	The Book of the Mango	3	5	0
		Do. do. (Marathi).			
104	1920	The Ganeshkhind Botanical Garden, Kirkee (Its Genesis and Development)	0	15	6
105	1920	The Groundnut Bug and its Control	0	2	0
106	1920	Dharwar American Cotton: Its History, Cultivation and Improvement	0	7	0
107	1921	Gonag—a Weed in Drilled Paddy	0	5	0
108	1921	Summary of the work done on Jalgaon Farm	0	5	6
		Do. do. do. (Marathi).			
110	1922	Year Book of the Agricultural Department in the Southern Division	0	5	0
111	1923	A Note on Well Boring	0	8	0
113	1923	Year Book of the Agricultural Department in Sind Division ..	0	8	6
114	1923	Studies on the Rice Plant and on Rice Cultivation ..	0	13	0
115	1924	Shevri as a Fodder Crop	0	3	0
116	1924	Sugar Industry in Western India and Methods of Sugar Manufacture	1	2	0
117	1924	Investigation in Fig Culture and Treatment	0	5	6

No.	Year.	Subject.	Price. Rs. a. p.
118	1924	Land Crabs as Agricultural Pests in Western India ..	0 8 0
119	1924	Year Book of the Agricultural Department in Southern Division, 1924	0 4 6
120	1924	Silage for Fodder in Western India	0 4 0
121	1924	Further Investigation on Potato	0 6 0
72		(Revised 1925) Experiments with the Automatic Water Finder in the Trap Region of Western India	0 4 0
122	1925	Sugarcane Varieties of Bombay Presidency, India.. ..	0 2 6
123	1925	Ridge Cultivation in Lower Gujarat	0 8 0
124	1925	The Chemical Composition of Food-grain Vegetables and Fruits of Western India	0 3 6
125	1925	Some of the promising exotic Sugarcane varieties of the Manjri Farm	0 13 0
126	1925	The Bhagnari Breed of Cattle in Sind and Baluchistan ..	0 6 0
127	1926	Elephant Grass—a new and useful Fodder Crop in Western India	0 1 0
128	1926	Cotton Cultivation in Sind	0 3 0
129	1926	The treatment of patches of Inferior Tobacco in Northern Gujarat	0 1 6
130	1926	Some useful forest Trees and Shrubs of the Coastal Tract and their fodder value	0 8 0
131	1926	The Fig Industry of Asia Minor	0 4 6
132	1926	The Improvement of Tobacco in Northern Gujarat..	0 4 0
133	1926	Work of the Ganeshkhind Botanical Gardens and Modibag Garden in 1921–25	0 2 0
134	1927	Murrah Buffaloes in Sind	0 2 6
135	1927	An improved method of growing Turmeric in the Deccan ..	0 4 0
136	1927	Cattle Breeding in the Bombay Presidency, Principles and Progress	0 5 6
137	1927	Notes on the Lemon Industry in Italy	0 2 0
138	1927	Injurious Field Rats of Lower Sind and their Extermination ..	0 7 6
139	1927	Sugarcane Mills and small power Crushers in the Bombay Presidency	0 6 6
140	1927	Tobacco Cultivation in the Southern Maratha Country ..	0 3 0
141	1927	Trees and Shrubs for producing Green Manure in the Konkan and North Kanara	0 3 0
142	1927	Dry Farming Methods in the Deccan	0 6 9
143	1927	Experiments on Cotton Manuring in Khandesh	0 1 3
144	1927	Furnaces for making Gul or Crude Sugar in the Bombay Presidency	0 7 3
95	(Revised 1927)	The Cultivation of Oranges and allied Fruits in the Bombay Presidency	0 3 0
145	1927	Origin, Plan and Progress of the Sakrand Agricultural Research Station, Sind..	0 4 3
146	1927	Crops of the Bombay Presidency : their Geography and Statistics, Part II	1 11 0
147	1927	Organisation and Cost of Gul-making in the Deccan Sugarcane tracts	0 2 6
148	1927	Culture of Guava and its improvement by selection in Western India	0 7 3
150	1927	Crops of Sind : their Geography and Statistics	2 1 0
151	1928	Selections in the Jowars of the Bombay Presidency ..	0 6 0

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No.	Year.	*Subject.*	Price. Rs.	a.	p.
152	1928	Water-finder Work in the Bombay Presidency	0	8	0
153	1928	Economic Value of Fruit Farming in Western India ..	0	6	0
154	1928	Assimilation of Nutrients by the Rice Plant (Technical series) .	0	5	0
155	1928	Die-back disease of Citrus trees and its relation to the soils of Western India	0	5	0
30	(Revised 1928)	Field, Garden and Orchard Crops of the Bombay Presidency	0	7	0
156	1928	Grape Culture in Western India	0	7	0
157	1929	Study of the Soils associated with the deterioration of the Cardamom Crop in North Kanara	0	3	0
158	1929	Preliminary Note on the possibilities of the development of Lemon Industry in Western India	0	2	0
159	1929	Agriculture in Sind under the Barrage Canals system ..	0	6	0
160	1929	Soils of the Bombay Presidency	0	7	0
161	1930	Cattle Feeds of Western India	0	1	0
162	1930	Popaya Cultivation in the Bombay Presidency	0	3	0
163	1930	Powdery Mildew of the Grape and its Control in Bombay ..	0	3	0
164	1930	Study in Intensive Farming near Poona under Canal Irrigation.	0	4	0
165	1930	The Frost of January 1929 and its damage to Crops of the Bombay Presidency	0	6	0
166	1931	Bansi Wheat of the Bombay Deccan and its Improvement ..	0	2	0
167	1931	Improvement of Manat lands in the North Konkan ..	0	2	0
168	1932	Preliminary Studies of important Crops in the Bombay Deccan in the post-war period	0	10	0
169	1932	Cumin powdery Mildew in Bombay	0	3	0
170	1932	Report on the Export of Mango to Europe in 1932.. ..	0	11	0
171	1932	Grassland Problems in Western India	0	3	0
172	1933	Summaries of the Annual Reports of the Experimental Work done under the Economic Botanist from 1893 to 1916 ..	0	2	0
173	1933	Marketing of some Agricultural Products exported from Bombay to the United Kingdom	0	3	0
174	1933	Composition of important Manures and Manurial Constituents of important Crops in Western India	0	2	0
		Publication on "Experiments in Manuring Crops in the Bombay Presidency, 1896 to 1931"	2	9	0
175	1934	Manufacture of White Sugar and Gul by the Open-Pan Process.	0	3	0
176	1934	Fungi of Bombay	0	12	0
177	1935	Pea Powdery Mildew in Bombay	0	3	0
178	1936	Improvement of Rice in the Bombay Karnatak, Part I—Selections in the Mugad and Antarsal varieties of Paddy ..	0	3	0
179	1936	Mineral Constituents of Food Grains, Vegetables and Cattle Feeds of Western India	0	1	0